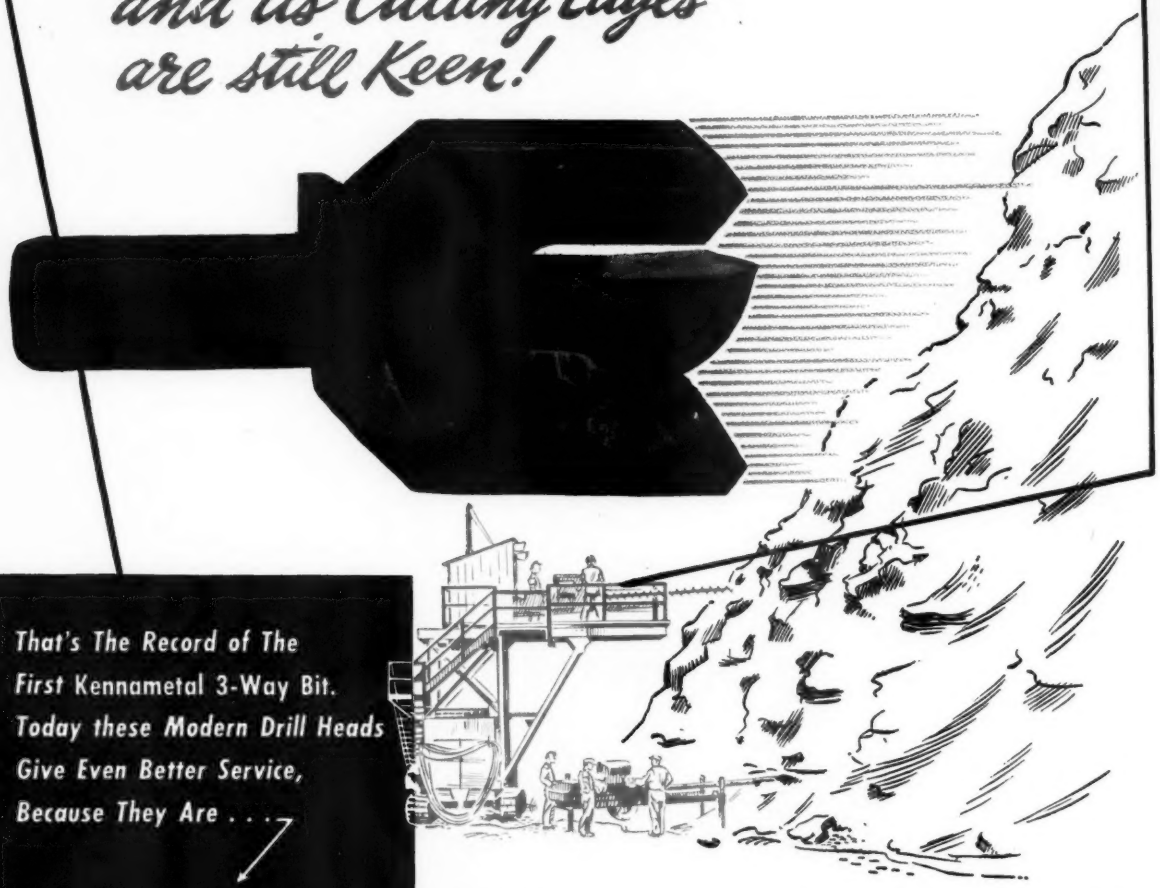
Mining CONGRESS JOURNAL

THE AMERICAN MINING CONGRESS

OCTOBER 1946

1500 FEET DRILLED

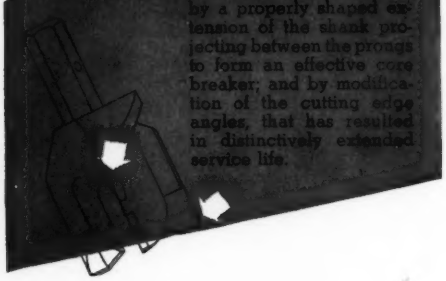
and its Cutting Edges are still Keen!



That's The Record of The First Kennametal 3-Way Bit. *Today these Modern Drill Heads Give Even Better Service, Because They Are . . .*

Now improved

by a properly shaped extension of the shank projecting between the prongs to form an effective core breaker; and by modification of the cutting edge angles, that has resulted in distinctively extended service life.



The Kennametal-tipped 3-Way Drill Bit shown above was the first of its type ever used by a surface mine. After drilling thirty 50-foot holes in typical overburden, its edges were still keen. Thus, the tool material that had previously revolutionized metal-cutting, demonstrated that it was ready to do an outstanding job for America's mining industry.

Today, Kennametal 3-Way Drill Bits are at work at scores of leading surface mines. Typical field experiences are as follows:

—Ohio mine reports: "Have used a Kennametal Bit continuously for one month and it is still cutting faster than any other type bit we ever used."

—Indiana mine says: "First Kennametal Bit used drilled holes needed in removing one-half million cubic yards of overburden, before being resharpened."

—Pennsylvania mine reports: "Kennametal Bit put down 15 holes, 60 feet deep, in 390 minutes, in overburden consisting of hard shale imbedded with limestone nodules. Did not need resharpening."

The Kennametal Drill Bit is a sturdy, one-piece heat-treated alloy steel casting, having cutting tips of Kennametal—the tool material that is much harder than the hardest tool steel (75 Rockwell C compared to 66). It is scientifically contoured to maintain gage throughout its long life. The shank is welded-in bar steel, adaptable to fit all common types of augers. *It is the first and only bit that drills holes without taper—and drills more of them faster, cheaper.* Ask us to show you the evidence.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

Mining CONGRESS JOURNAL

Contents

VOLUME 32 NUMBER 10 FOR OCTOBER 1946

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FRONT COVER: Ball Mills and Classifiers in the Morenci Hill of Phelps Dodge Corporation, Morenci, Arizona. *(Photo courtesy U. S. Bureau of Mines.)*

	Page
EDITORIAL	23
NATIONAL MINERAL POLICIES By HON. J. A. KRUG	24
THE WORLD'S LARGEST COAL MINE	28
ORE RESERVES AND FUTURE EXPLORATION By RENO H. SALES	30
MECHANIZED MINING IN EASTERN OHIO By A. F. WHITT and E. F. MAURER	35
DEVELOPMENTS IN UNDERGROUND DRILLING AND BLASTING PRACTICE By W. T. WARREN	39
MINING ASSOCIATION OF MONTANA MEETS	42
METAL MINING CONVENTION AND EXPOSITION PROVE HUGE SUCCESS	43
Declaration of Policy	50
Digest of Papers	60-84
FLOTATION CONCENTRATES AS A SOURCE OF SULPHUR By W. W. DUECKER and E. W. EDDY	85
PILLAR RECOVERY IN THIN SEAM MINING By The Committee on Roof Action	91
WHEELS OF GOVERNMENT	95
PERSONALS	97
NEWS AND VIEWS	99
MANUFACTURERS FORUM	110

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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309 MUNSEY BLDG., WASHINGTON 4, D. C.

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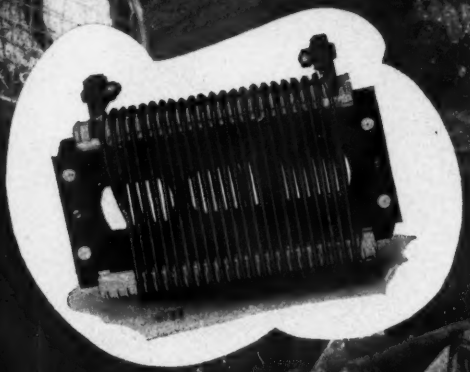
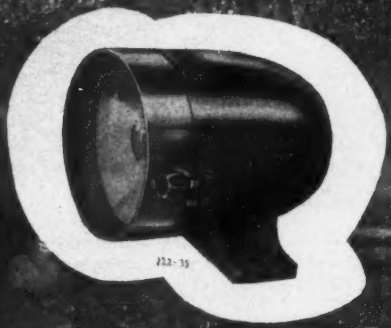
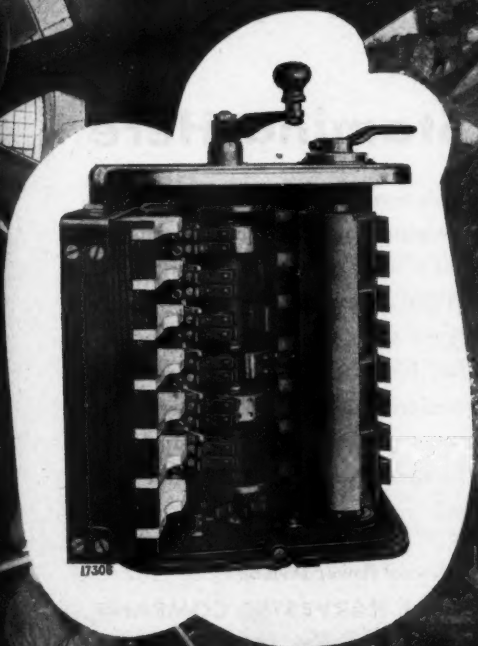
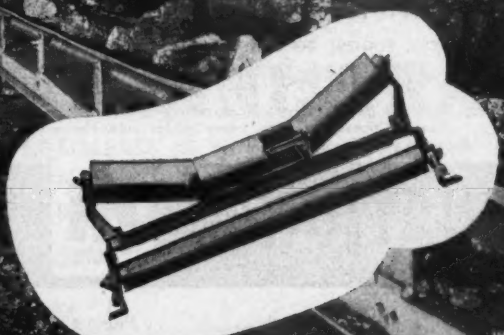
JEFFREY GENUINE

RENEWAL PARTS



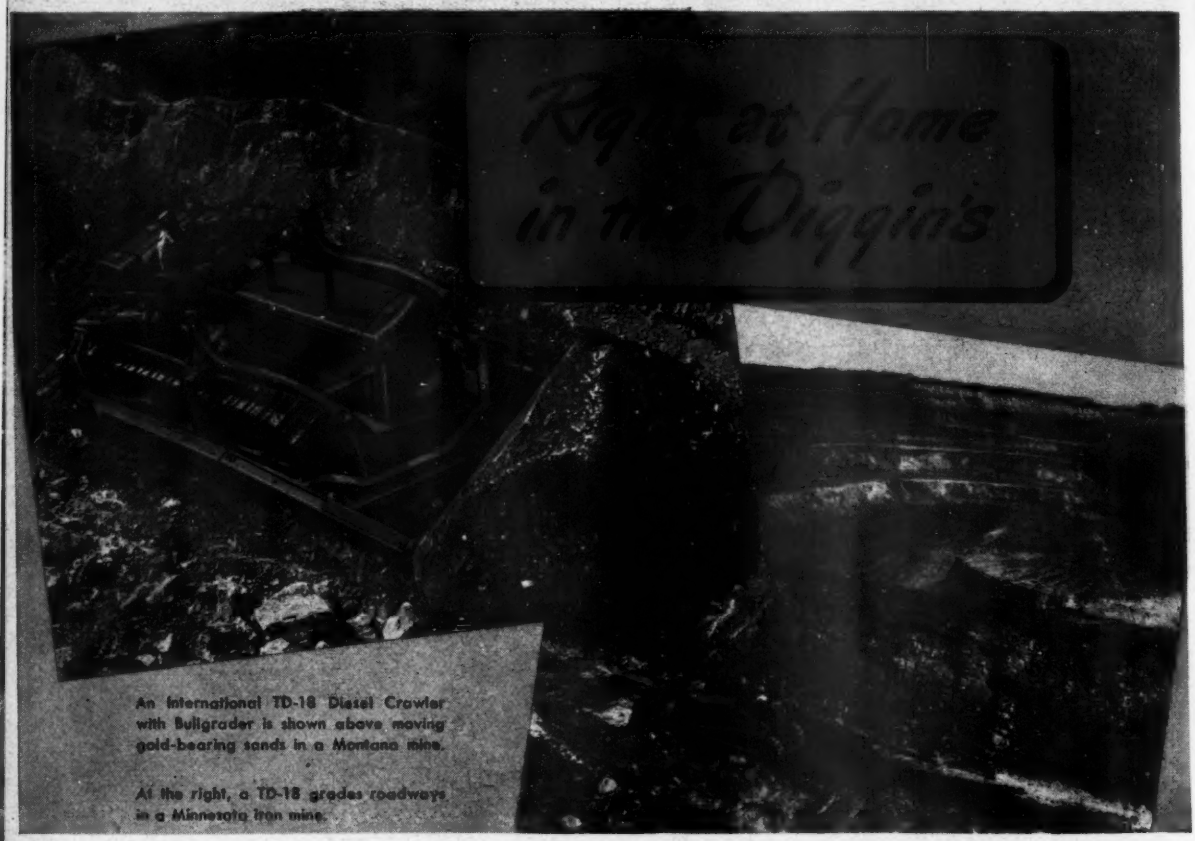






Economical maintenance of the wide range of Jeffrey equipment operating in all the coal-producing states can be most successfully handled with Jeffrey Genuine Renewal Parts. They are designed and manufactured for the equipment . . . Parts that fit easily and quickly into place. Specify Jeffrey on your Renewal Parts.

THE JEFFREY MANUFACTURING COMPANY



An International TD-18 Diesel Crawler with Bulgrader is shown above moving gold-bearing sands in a Montana mine.

At the right, a TD-18 grades roadways in a Minnesota iron mine.

INTERNATIONAL Diesels Prove their Stamina Here

Untiring capacity for work, persistent hang-on where steep grades or heavy loads would stall another tractor, great endurance because of rugged construction, and instant readiness to start the day's jobs—these are characteristics that make International Diesel Crawler Tractors thoroughly at home in the diggin's. Yes, these are qualities that give Internationals their ability to take on the toughest assignments and carry them through.

There isn't a mine anywhere that can't use International Diesels to advantage . . . to build and maintain access roads; to strip overburden; to dig ore or coal or even plastic clay. And they do this work efficiently with low-cost fuel and at minimum expense for maintenance or repair. That's why they're popular where working conditions are extremely taxing. That's why they deserve your serious consideration, no matter what kind of a mine you operate.

See the International Industrial Power Distributor near you and let him recommend and supply the tractors and equipment that will serve you best.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue • Chicago 1, Illinois

Tune in "Harvest of Stars" every Sunday, NBC Network. See newspapers for time and station.

INTERNATIONAL Industrial Power

INTERNATIONAL HARVESTER

"IF THAT TOP KICK COULD JUST SEE ME NOW!"

VETERANS! WHY NOT RUN YOUR OWN BUSINESS?

You can cash in on what you learned in the army about welding. Thousands of 200, 300 and 400 Ampere AC and DC Arc Welding units are surplus and available to you on veteran priority. There are large quantities of Hobarts and Lincolns, quite a few Westinghouse and fair amounts of other makes for sale now. Most of the equipment is used and in good operating condition. Best of all, it is being sold at prices you can afford in setting up your own repair shops or for contract work. Write, wire or phone the nearest War Assets Administration Regional Office below or come in and ask for the special veterans' service section.

FREE INFORMATION

For full information clip and mail this coupon to War Assets Administration:

Please send me complete information on the availability, condition and location of the following types of equipment:

☐ Hobart Arc Welders
☐ Lincoln Arc Welders
☐ Westinghouse Arc Welders
☐ Electrodes and Welding Rods

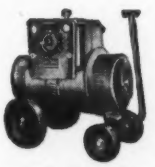
Arc Welding Equipment: AC.... DC....
Electric Motor Driven: Volts....Phase....Cycles....
Transformer Type: Volts....Phase....Cycles....

Name.....

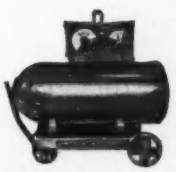
Firm.....

Address.....

City.....State.....



Hobart — Standard models of this make available in large quantities and most ratings.



Lincoln—In all models and most ratings. Hundreds in the popular 300-400 Ampere size.

EXPORTERS: Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

All arc welders are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the material offered herein.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

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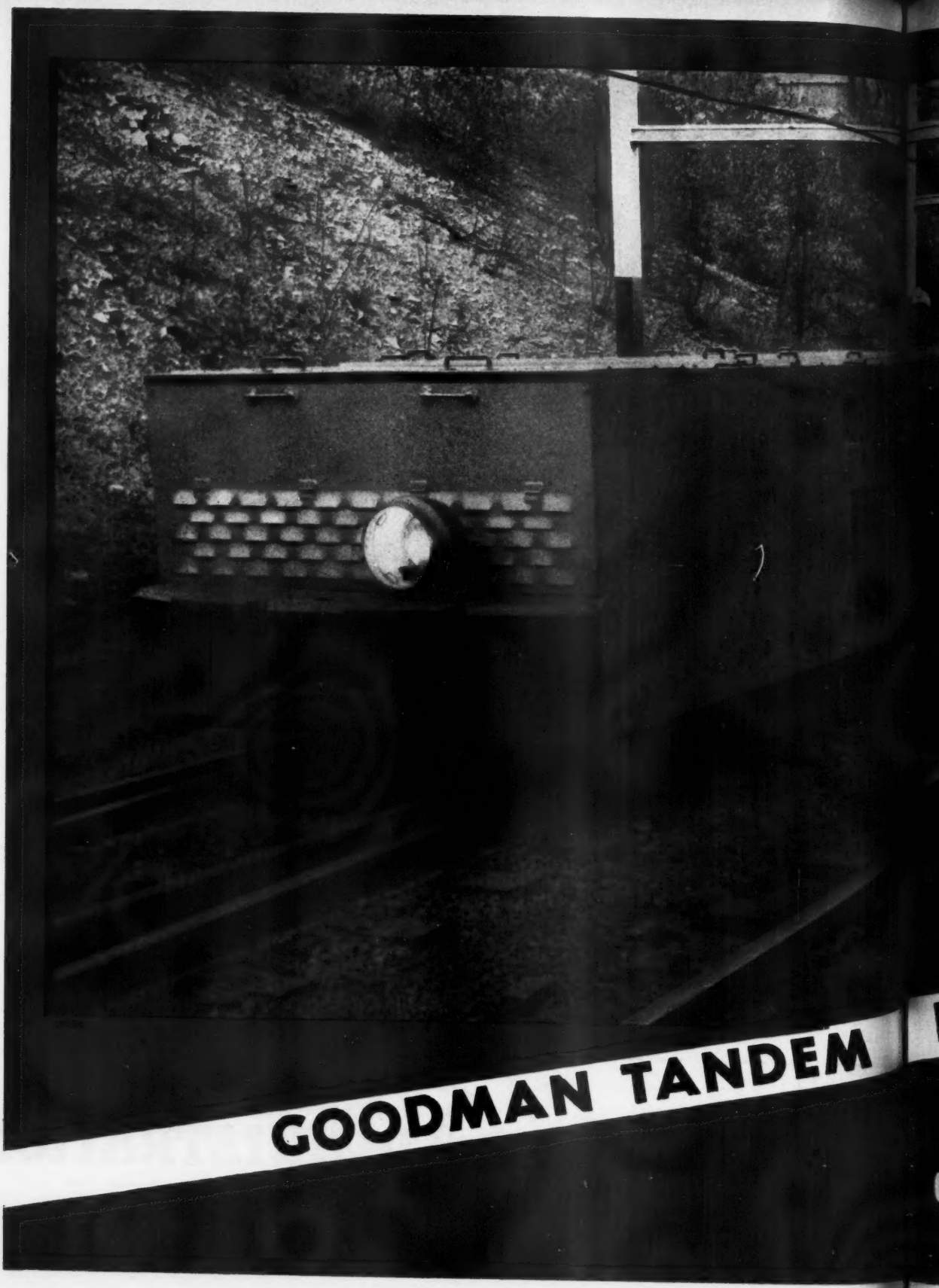
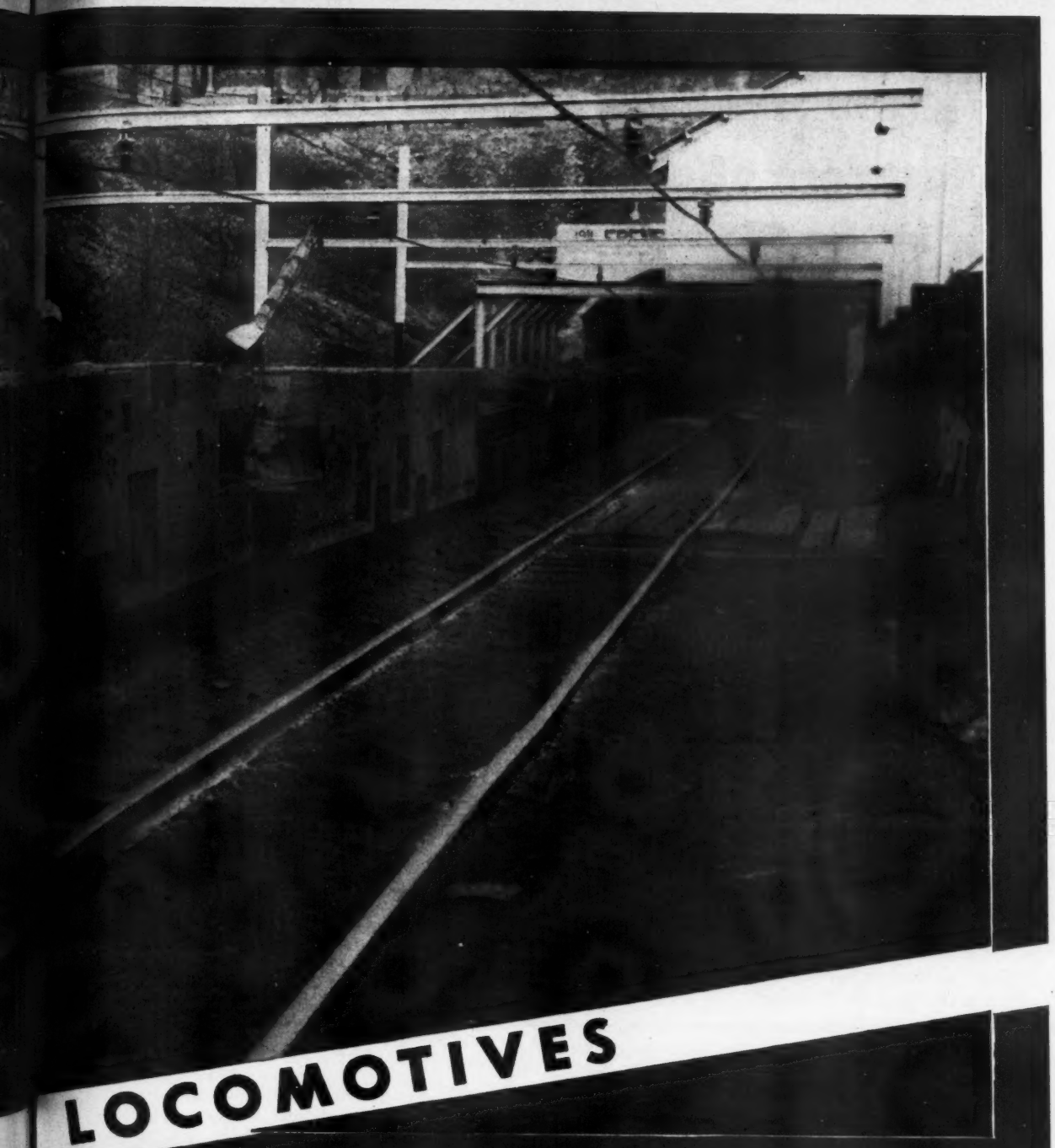

GOODMAN TANDEM



LOCOMOTIVES

This powerful 40-ton tandem unit of 720 horsepower is used on a main line haul of over two miles with a 2½% grade against the load for the entire distance.

GOODMAN MANUFACTURING COMPANY

CHICAGO 9, ILLINOIS

Now...

for more effective Public Relations in the Bituminous Coal Industry

. . . A STRENGTHENED BITUMINOUS COAL INSTITUTE

● For some time it has been increasingly evident that the public relations work of the Bituminous Coal Institute could be made even more effective and the efficiency of its operation improved *by closer coordination with the National Coal Association.*

To accomplish this, on last August 1st, the B.C.I. Board of Directors unanimously adopted the recommendations of its Policy Committee to:

1. Transfer the headquarters of the Bituminous Coal Institute from New York City to Washington, D. C.

2. Replace the office of General Manager of B.C.I. by a Director of Public Relations coordinating with the Executive Secretary of the National Coal Association.

3. Reorganize and redefine the set-up and functions of the Bituminous Coal Institute staff so as to accomplish the greatest possible degree of effectiveness in its activities.

The move from New York and the reorganization of the B.C.I. staff have been completed and the Institute is now in operation in Washington, in offices in the Southern Building.

Ralph C. Mulligan, for many years on the staff of the National Coal Association, has been chosen as the Institute's Director of Public Relations.

Making Friends Through Understanding

For its three years of existence, the Bituminous Coal Institute has a record of solid accomplishment in improving the public relations of the Bituminous Coal industry, by making the facts about it known to the public. Now the work of building friendship for the industry should be accelerated.

While there is unmistakable evidence that the coal industry has gained friends, there is still a big job to be done—and the industry's public relations program, which has been so well begun, must now be continued more vigorously and zealously than ever.

B. C. I. Is Important to YOU

You . . . and every member of every branch of our industry . . . will reap the benefit of the Bituminous Coal Institute's public relations program.

The B.C.I. will . . . and *must* . . . deal with many of the important public relations problems that confront the coal industry on a national basis. And although these problems may be national in scope, they are local in effect. As you can appreciate, they relate to your business—whether you are a producer, a wholesaler, or a retailer of Bituminous Coal.

And the *amount of benefit* you . . . or anybody in the coal business . . . will ultimately derive from the B.C.I.'s public relations activities depends in large measure upon the *amount of support* these activities receive.

The forward-looking operators who now finance the Bituminous Coal Institute will welcome, and should have, the active financial and moral support of every Bituminous Coal producer.

BITUMINOUS COAL

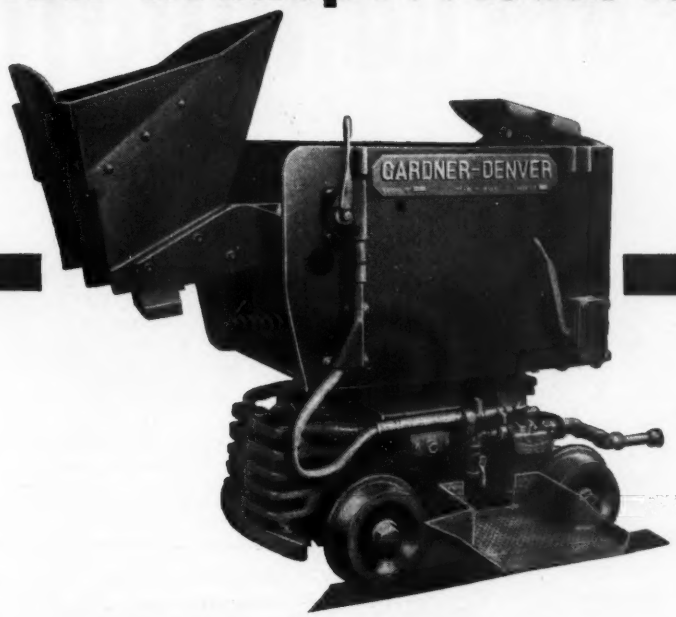
BITUMINOUS COAL INSTITUTE

Affiliated with NATIONAL COAL ASSN., Washington, D. C.

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

now the GD14

. . . wider cleanup . . . loads larger cars



more power . . . more speed! **Here's the loader you've been looking for—with more power—more speed—and a wider cleanup range! With its two highly efficient five-cylinder air motors, the new Gardner-Denver GD14 Loader is big, sturdy and *fast*. A companion model to the famous GD9 Loader, it utilizes the Gardner-Denver fulcrum principle to take a bigger bite out of your muck piles—to empty the dipper quickly.**

lower center of gravity!
In the GD14, the main weight of the loader has been concentrated near the wheels. This lower center of gravity means maximum stability on the track—greater safety for operators.

cleaner design— no exterior piping!
Gardner-Denver engineers designed this new loader with a minimum of outside piping, elbows, etc. These elements are on the inside of the loader—where they present no hazard for the operator. This is another important Gardner-Denver safety factor.

fewer gears— less power loss!
Shaft drive through bevel gears on all four wheels—has fewer gears—you get more of the available power of the air motor. All gears housed in the base of the machine—no separate housing on outside.

adjustable swing stops!
Dipper swing stops are adjustable to limit maximum swing of the dipper to either side. Individual adjustments can be made to suit the clearance on each side of the loader when it is in operation, to avoid danger of tilting.

automatic centering device!
Muck goes into the mine car—not to the side—with the GD14! An automatic centering device locks the body of the loader on center so that dipper discharges directly into the car.

automatic cut-off!
The power of the dipper motor is automatically cut off just as the dipper reaches its upper or lower limit of travel. This protects the machine from discharge shocks—eliminates all slack in dipper chains.

proved performance!
Like all Gardner-Denver products, the GD14 Loader has been thoroughly tested in the field. Two years of actual operation under toughest conditions precede this introduction.

Plus *Convenient clutch on operator's side—built-in line oiler—heavy double dipper chain attached to equalizer to provide even pull in digging—rounded rear shield for close coupling to mine car, knocks down easily into complete subassemblies when necessary for moving through shafts and winzes.*

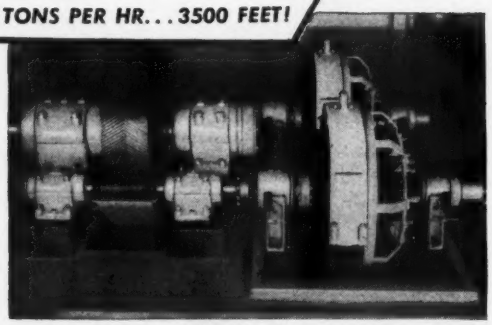
GARDNER-DENVER
Since 1859

USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

For complete information, write Gardner-Denver Company, Quincy, Illinois.

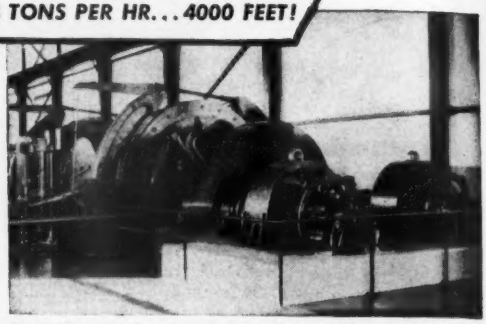
HIGH-SPEED HOISTS SET

360 TONS PER HR...3500 FEET!



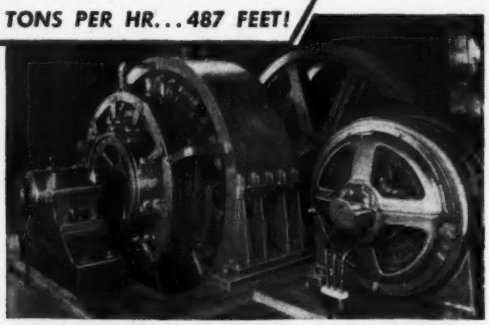
Two G-E amplidyne-controlled hoist drives serve a mine in northern Michigan. The main ore hoist is rated 3000 hp and at a speed of 2400 feet per minute, carries 360 tons per hour from a depth of 3500 feet.

408 TONS PER HR...4000 FEET!



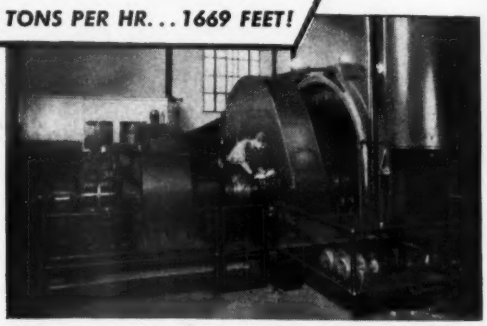
A mine in the Adirondacks uses three G-E amplidyne-controlled hoists. One, utilizing two 1000-hp d-c motors is shown above. It shifts 408 tons per hour from a level of 4000 feet at a speed of 2000 feet per minute.

750 TONS PER HR...487 FEET!



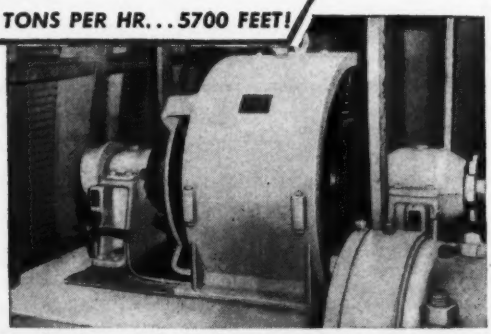
This mine hoist in the soft coal fields of Pennsylvania is driven by a G-E 1250-hp motor, amplidyne-controlled. It brings 750 tons of coal to the top every hour from a depth of 487 feet. Hoist speed hits 2900 feet per minute.

280 TONS PER HR...1669 FEET!



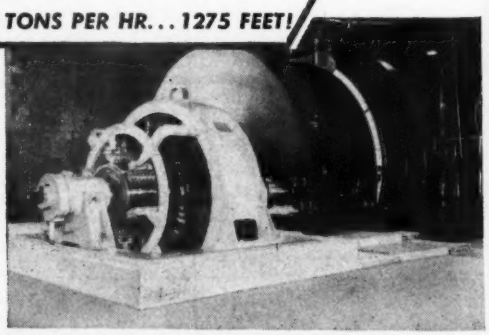
This main hoist at an iron mine is powered by a G-E 1000-hp d-c motor, amplidyne-controlled. Smooth control of the hoist brings up 280 tons per hour at this mine.

143 TONS PER HR...5700 FEET!



One of two 600-hp G-E hoist drives installed at a lead and zinc mine in the West. Fast acceleration and deceleration is necessary to raise 143 tons of ore per hour from a distance of 5700 feet.

390 TONS PER HR...1275 FEET!



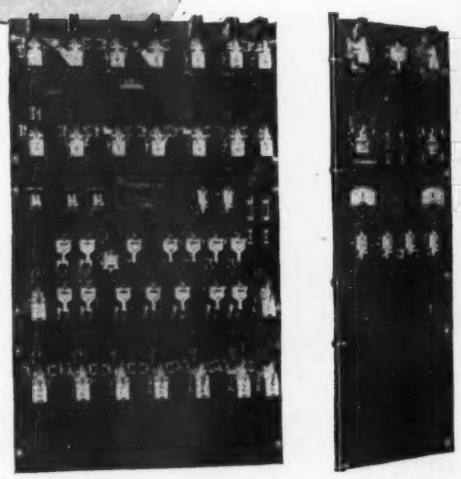
An iron mine keeps the main hoist in its 1275-foot mine moving at a speed of 1500 feet per minute with a G-E amplidyne-controlled drive motor, rated 1250 hp. Hoist load is 390 tons per hour.

GENERAL ELECTRIC

657-55-148

NEW TONNAGE RECORDS

G-E amplidyne hoist control gives those mine operators more trips per hour with capacity loads . . . the simple way.



Since 1941, more than 20 G-E amplidyne-controlled hoist drives have been installed at almost every type of underground mine. Performance is improved—tonnage handled is up! The shaft is no longer a bottleneck. Maintenance problems are minimized.

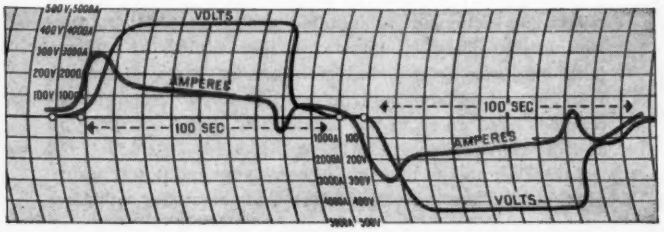
FAST STARTS—QUICK STOPS The outstanding characteristics of an amplidyne-controlled drive are FAST acceleration and FAST deceleration. The time required by the drive to "level out" at a high running speed or drop to a complete standstill is short. High-speed hoist operation is thus made practical by the accurate and positive control of the G-E amplidyne.

SMOOTH CONTROL ALWAYS! On the chart below you'll notice the smooth acceleration under positive current limit—a result of G-E amplidyne-controlled hoist drive. A safe current limit is quickly reached and rigidly maintained by the amplidyne; the speed is nearly constant throughout the lift. Mechanical stresses are greatly reduced and equipment is fully protected.

Whether you're thinking of modernizing an old hoist or installing a new unit, you'll be interested in the data a G-E application engineer can give you. Why not get in touch with your nearest G-E field office? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

OLD system—this control board (left) for a large hoist is burdened with a large number of contactors and relays.

NEW system—amplidyne takes over, a few small relays are substituted and panel cut to this size (right). Needs little attention, operation is simplified, and upkeep costs are reduced.



This chart shows typical volt-ampere characteristics afforded by a G-E amplidyne control system with a hoist operating from a flywheel motor-generator set. Note positive accelerating current limit, smooth acceleration and maintenance of full speed.

FAITHFUL RESPONSE of mine hoists to control operation is provided by the G-E amplidyne. The amplidyne is a high ratio (up to 10,000 to 1) exciter for the hoist generator driven at constant speed by a motor. The operator manipulates but one field to obtain complete control of the fastest mine hoist, in this simplest of all hoist control systems. The controlled output of the amplidyne serves to regulate generator voltage to the main hoist motor. FREE booklet gives full information on the amplidyne. Ask for Bulletin GEA-4053. Section 657-55, General Electric Co., Schenectady 5, N. Y.

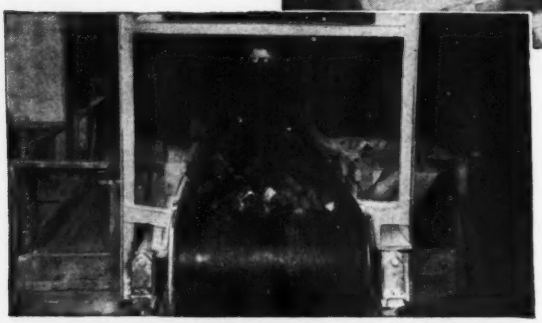
GE

Amplidyne-Controlled Hoist Drives

How a Northern Mine Modernized Ore Conveyors with LINK-BELT BELT CONVEYORS and DRIVES

Run-of-mine ore feeds on to No. 1 picker (Link-Belt 42" wide picking belt conveyor) for hand picking of waste rock which is thrown into waste disposal chutes.

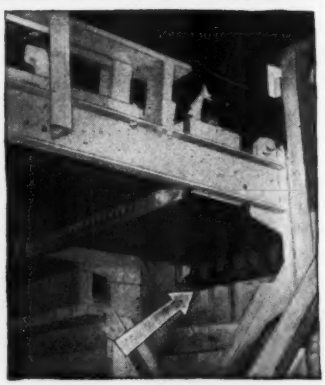
Another view of Link-Belt picking belt conveyor which discharges ore to gyratory crusher delivering crushed ore onto conveyor No. 4.



General view of plant showing mine-shaft, belt conveyor galleries, etc.

Discharge end of No. 4 Link-Belt Belt Conveyor, showing Link-Belt D-6 Herringbone Gear Speed Reducer and L-B Differential Back-Stop. Link-Belt Worm Gear Speed Reducers are used on other conveyor drives.

View looking under No. 1 belt conveyor, showing Link-Belt rubber-tread return idler. Individual supporting treads induce a bending, kneading belt action which breaks adhering materials free, while rubber-to-rubber contact eliminates destructive chemical reaction.



• Like so many other mining companies throughout the country — and the world — the engineers of this northern mine selected Link-Belt Roller Bearing Belt Conveyor Idlers for their ore conveying system.

Link-Belt Roller Bearing Belt Conveyor Idlers are the result of almost 50 years of constant development. Engineering that progressed to keep ahead of growing service needs, has achieved outstanding design in today's Link-Belt Idlers. They are known for their ability to perform with minimum power and maintenance costs, maximum belt life and dependable trouble-free service. Equal attention has been given to the application of the correct type of Link-Belt power transmission drives.

Link-Belt makes a variety of conveyors and power transmission machinery, and Link-Belt engineers offer unbiased advice, helpful service in planning conveying systems and in selecting equipment. Write or call the nearest Link-Belt office for recommendations. There is no obligation.

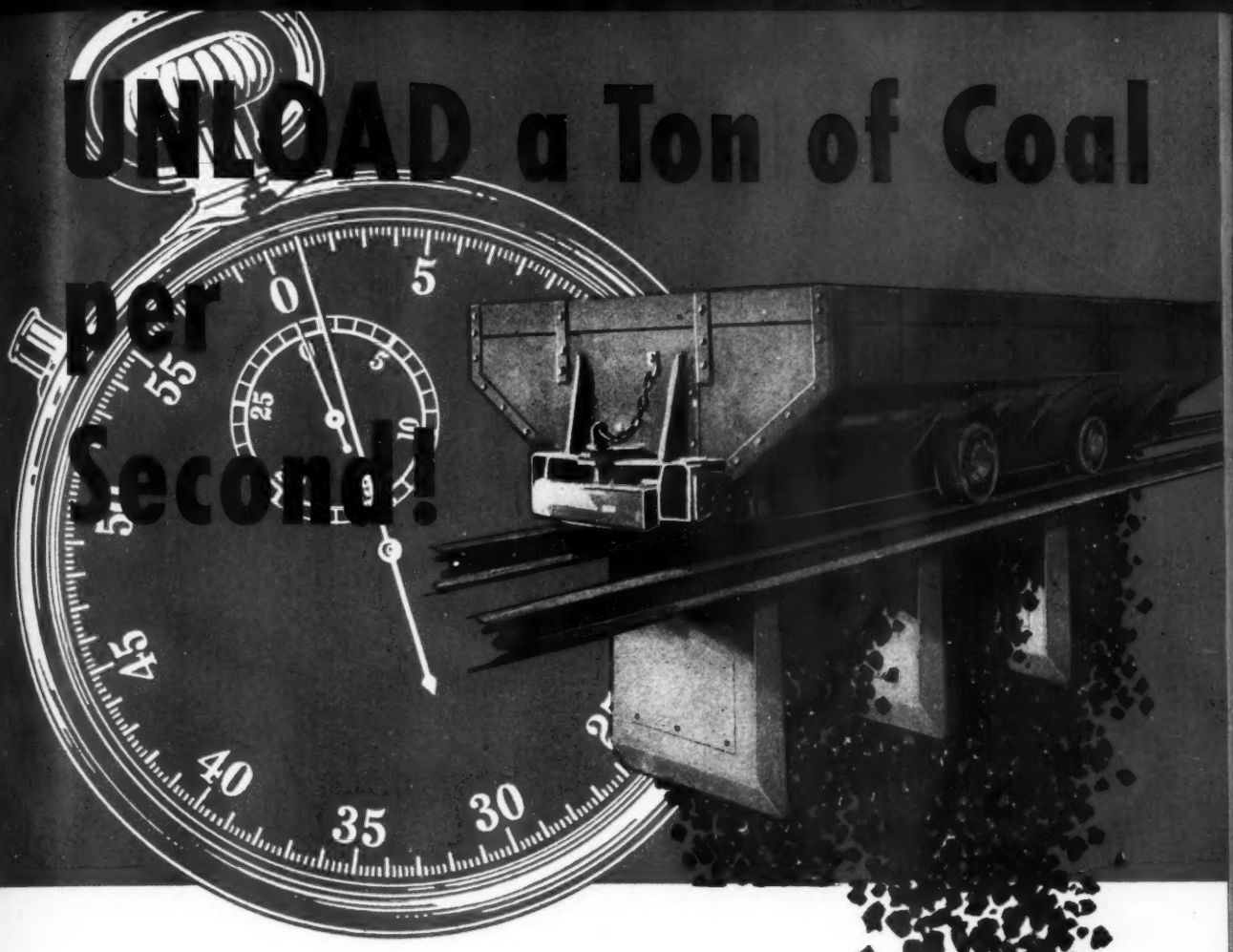
LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5
San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices in Principal Cities.

10,296-D

LINK-BELT PRODUCTS INCLUDE: Conveyors, Elevators and Feeders of all types; Vibrating Screens; Washers and Classifiers; Chain Drives; Speed Reducers; Variable Speed Changers; Gears; Clutches; Couplings, Bearings, etc. Send for Catalogs.

UNLOAD a Ton of Coal per Second!



Yes, actual timing has shown that with a proper storage bin it is possible to dump a 16-car trip of 5-ton a.c.f. Drop-Bottom Mine Cars in 80 seconds! A "ton-per-second" unloading time!

Such speed in dumping permits cars to be returned to the mine immediately—saving precious minutes for greater loading efficiency!

Why not ask our Sales Representatives about using a.c.f. Drop-Bottom Mine Cars in your mine—to increase your daily production—to lower your transportation costs.

AMERICAN CAR AND FOUNDRY COMPANY

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MINE CARS

EVEN IN THE WETTEST PLACES...

"Monobel" AA helps move out more coal —faster

(ABOVE) Water flows into bore hole as shot-firer loads charge of "Monobel" AA.

(LEFT) "Monobel" AA places large lump coal near the face . . . speeds mechanical loading. Good fumes permit quick return to the working place.

"MONOBEL" AA resists water and gives you better coal even in extremely wet working places. In many mines, this new permissible—a powerful coal-getter developed by Du Pont research—is shot after it has been loaded and under water for an entire shift!

"Monobel" AA gives you big lump coal right up close to the face. High-speed mechanical loaders can get at it in a hurry. It helps increase percentage recovery. Fumes are Class A, allowing quick return to the working place.

In addition, you get clean, square-sheared ribs and face with "Monobel" AA. Users also report that "Monobel" AA saves them drilling time because frequently fewer holes are required . . . and many have found that it eliminates the need for using two or more permissibles.

In these times, maximum efficiency in getting coal out faster is highly desirable. That is why "Monobel" AA has so rapidly gained in popularity. Today it is one of the best-selling permissibles. Ask any Du Pont Explosives Representative for complete information.

E. I. DU PONT DE NEMOURS & CO. (INC.)
EXPLOSIVES DEPARTMENT
WILMINGTON 98, DELAWARE

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STANDARD ENGINEERS NOTEBOOK

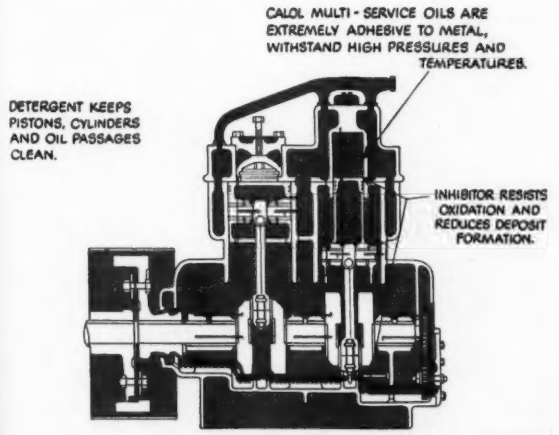
Multi-use oils resist high temperatures, pressure

Many of the industrial bearings and machines that operate at high temperatures and under extreme pressures can be efficiently lubricated with Calol Multi-Service Oils.

They are specially compounded. An oxidation inhibitor prevents the formation of excessive gum and sludge deposits. A detergent gradually loosens and removes lacquer or other contaminants from moving parts and oil systems. Calol Multi-Service Oils have a high metal-adherent quality and actually cling to the hottest spots.

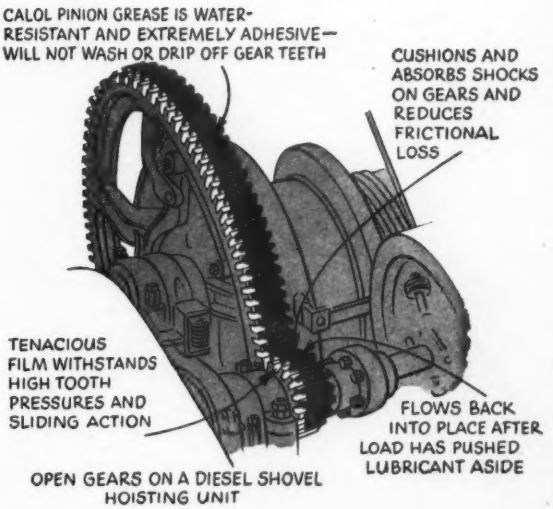
Calol Multi-Service Oils have a wide use range. They are especially recommended for air-compressor cylinders and bearings, Diesel and natural gas engines, inclosed reduction gears and bearings.

They come in six viscosity grades: Number 45X is approximately SAE 10; number 50X, SAE 20 (medium); number 55X, SAE 20 (heavy); number 65X, SAE 30; number 75X, SAE 40; number 85X, SAE 50.


CALOL MULTI-SERVICE OILS ARE EXTREMELY ADHESIVE TO METAL, WITHSTAND HIGH PRESSURES AND TEMPERATURES.
DETERGENT KEEPS PISTONS, CYLINDERS AND OIL PASSAGES CLEAN.
INHIBITOR RESISTS OXIDATION AND REDUCES DEPOSIT FORMATION.

TWO-STAGE, 2-CYLINDER AIR COMPRESSOR.

CALOL MULTI-SERVICE OILS HAVE WIDE USE RANGE FOR HOT-RUNNING INDUSTRIAL BEARINGS.


CALOL PINION GREASE IS WATER-RESISTANT AND EXTREMELY ADHESIVE—WILL NOT WASH OR DRIP OFF GEAR TEETH
CUSHIONS AND ABSORBS SHOCKS ON GEARS AND REDUCES FRICTIONAL LOSS
TENACIOUS FILM WITHSTANDS HIGH TOOTH PRESSURES AND SLIDING ACTION
FLOWS BACK INTO PLACE AFTER LOAD HAS PUSHED LUBRICANT ASIDE
OPEN GEARS ON A DIESEL SHOVEL HOISTING UNIT

Tacky grease sticks to open gears, cuts wear

The problem of keeping lubricant on exposed gears is eliminated by the use of Calol Pinion Grease.

Calol Pinion Grease is water-resistant and will not wash off gears in rain or other wet conditions. It maintains a tenacious film that will not drip off, but flows slowly back into place after pressure and sliding action of gear teeth have pushed it aside. This prevents excessive loss of lubricant and keeps a cushion on the teeth which absorbs shocks, reduces frictional loss and wear.

To meet all conditions, Calol Pinion Grease is made in four grades. In the proper grade, it is recommended for all types of open gears.

Number 0 is particularly adaptable for exposed, high-speed gears operating in cold weather and may be used on wire rope. Numbers 1 and 2, for medium-speed, exposed gears, are slightly heavier and more adhesive. Number 5, very heavy, is for severe pressure and temperature conditions.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Col.; Standard Oil Company of Texas, El Paso, Texas.

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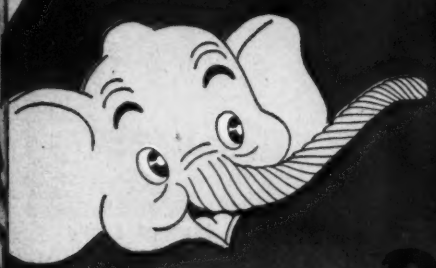

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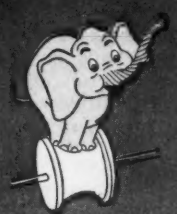
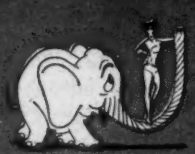


UNION-FORMED SPOOLS BETTER . . . even with a light load it winds evenly and tightly.



UNION-FORMED RESISTS KINKING . . . because wires and strands are free of internal stress—they do not fight to get out of their preformed positions.

UNION-FORMED HAS GREATER RESISTANCE TO BENDING FATIGUE . . . withstands more bends, even reverse bends, because it is more stress-free internally.

UNION-FORMED RIDES BETTER ON GROOVES . . . does not spin over sheaves or grind through blocks.

UNION-FORMED IS SAFER TO HANDLE . . . worn, broken wires do not spring out and porcupine but continue to lie close to the rope.

UNION-FORMED IS FLEXIBLE and RELAXED . . . bends in any direction, yet has "toughness" to withstand jerking and other punishing strain.

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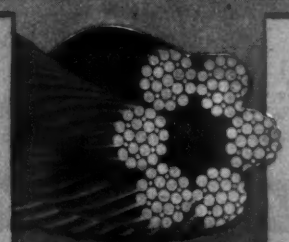

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Union's is an organization of specialists which devotes its whole time to bettering wire rope.

Here pictured is an important part — the link between user and Union's laboratory and factory. This staff of field specialists man Union's branch warehouses and offices. It works in the field with strategically located distributors.

This not only provides wire rope users with an S. O. S. (service on schedule) source of supply close at hand — it also equips each outlet with the extra "know-how" for proper wire rope application. The end result is better service from better wire rope better fitted to the individual machine and job.

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For dependable, fast freight service always . . .

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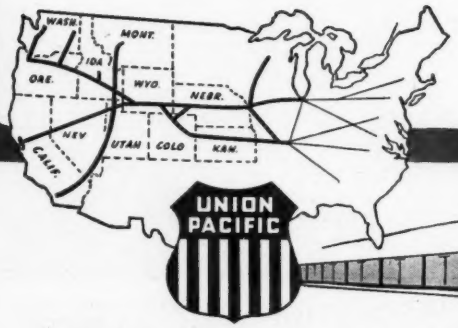
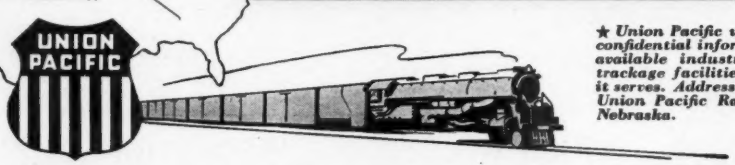




★ *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD

The Strategic Middle Route

IN WIND, RAIN, SNOW OR HAIL • YOUR FREIGHT GETS THERE BY RAIL!

ARE HARD, TROUBLE-FREE WORKERS!

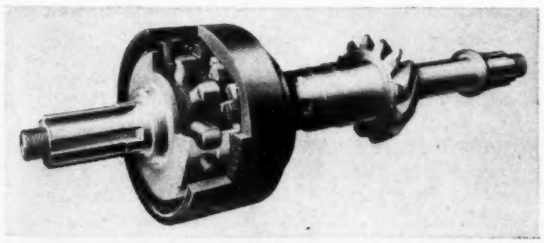
Here's a bogie that's a leader in the field today. It provides increased flexibility, efficiency and durability. It does away with bogie hopping, unequal tire wear and hard steering. Torque reaction is balanced out, eliminating weight transfer and assuring equal traction on all wheels.

Furthermore, it's not added weight or complicated parts that give these advantages . . . it's perfected balancing. The Mack bogie is actually simplified and lightened.

Most important among its many features are two Mack exclusives: One, the Mack Power Divider, preserves traction on slippery ground without overstress on any part, and prevents wheel fight and tire wear. The other, Mack rubber Shock Insulators, makes twisting of the springs impossible even over roughest roads.

The Mack bogie is only one of the reasons Mack 6-wheelers are preferred where the hauls are tough.

THE MACK BOGIE is rugged, yet unusually simple and accessible. Perfected balancing makes bogie hopping, wheel fight and tire scuffing unknown.



THE MACK POWER DIVIDER, a third differential which transmits torque to whichever axle maintains the most traction. Prevents wheel fight, tire wear, and over-stress on parts.

Mack

TRUCKS

FOR EVERY PURPOSE

PERFORMANCE COUNTS!

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

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ANACONDA COPPER MINING CO.,
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AMERICAN GILSONITE CO.,
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BASIC MAGNESIUM PROJECT;
Las Vegas, Nevada Housed 3600 men Mess hall, field cafeterias served 20,000 meals a day Complete recreation facilities.

FRUIT GROWERS SUPPLY CO.,
Lumber Town of 5000 people, Westwood, Lassen County, Calif. Restaurant, coffee shop, family style mess hall, recreation room, soda fountain, hotel.

MT. WHITNEY LUMBER CO.,
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BOULDER DAM, NEVADA;
Fed 5000 men for 5 years. Modern laundry and dairy included in operation.

U. S. ARMY ENGINEERS;
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PARKER DAM, ARIZONA-CALIFORNIA
1000-man camp, dormitories, commissary, mess hall and general store.

Well housed — well fed workmen...

are more *efficient* workmen. It pays to *keep* them happy.

H. S. Anderson Company does the *complete* "housekeeping" job for your mine crew. We design, equip and operate permanent or temporary mining, lumber and construction camps . . stores . . commissaries . . . mess halls . . . cafeterias . . industrial hotels.

Our company has rendered this complete service to Western Industry—from Alaska to Texas—for the past 30 years. This long specialization places a proved organization at your service . . thoroughly trained administrative and supervisory staff . . . central purchasing offices . . . warehouse and personnel departments.

Apply this efficient "housekeeping" at your mine. Relieve yourself of the responsibility, time and effort required under present day conditions to conduct such operations.

Write telling us something of your requirements.
H. S. Anderson Company is ready to serve you . . . Well and Now.

H. S. ANDERSON CO.

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BATTERY-POWERED Shuttle Cars Reduce Power Peaks

...ALKALINE BATTERIES Reduce Dead Weight

BECAUSE battery-operated shuttle cars carry their own power supply, they place no load on the mine d-c power supply while operating. Their batteries can usually be charged during off-peak hours thus reducing maximum power demand. A lower maximum demand is assured even when continuous shuttle car operation requires constant charging of exchange batteries, because a charging load is always more steady than a gathering load.

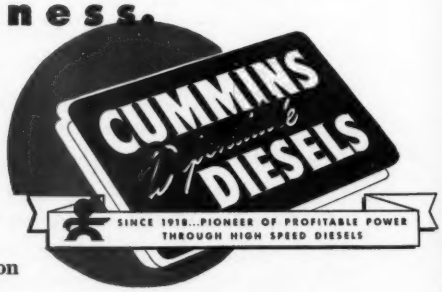
High operating flexibility is also obtained with battery-powered shuttle cars. Being self-contained units, they can take the shortest practical route from face to loader and back. No time is lost in making and breaking external power connections or round-about maneuvering to avoid running over them. They are also easiest to keep in working order because they have the minimum number of working parts.

Altogether, the superior flexibility, high availability and overall operating and maintenance economy of the battery-powered shuttle car make it an inherently dependable and efficient haulage unit . . . especially when powered with Edison Alkaline Batteries. With steel cell construction, an electrolyte that is a preservative of steel, and a fool-proof electrochemical principle of operation, they are the longest-lived, most trouble-free and most durable, yet lightest, of all mine haulage batteries. The Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Co. Limited, Montreal and Toronto.

Edison
ALKALINE BATTERIES

* dependable

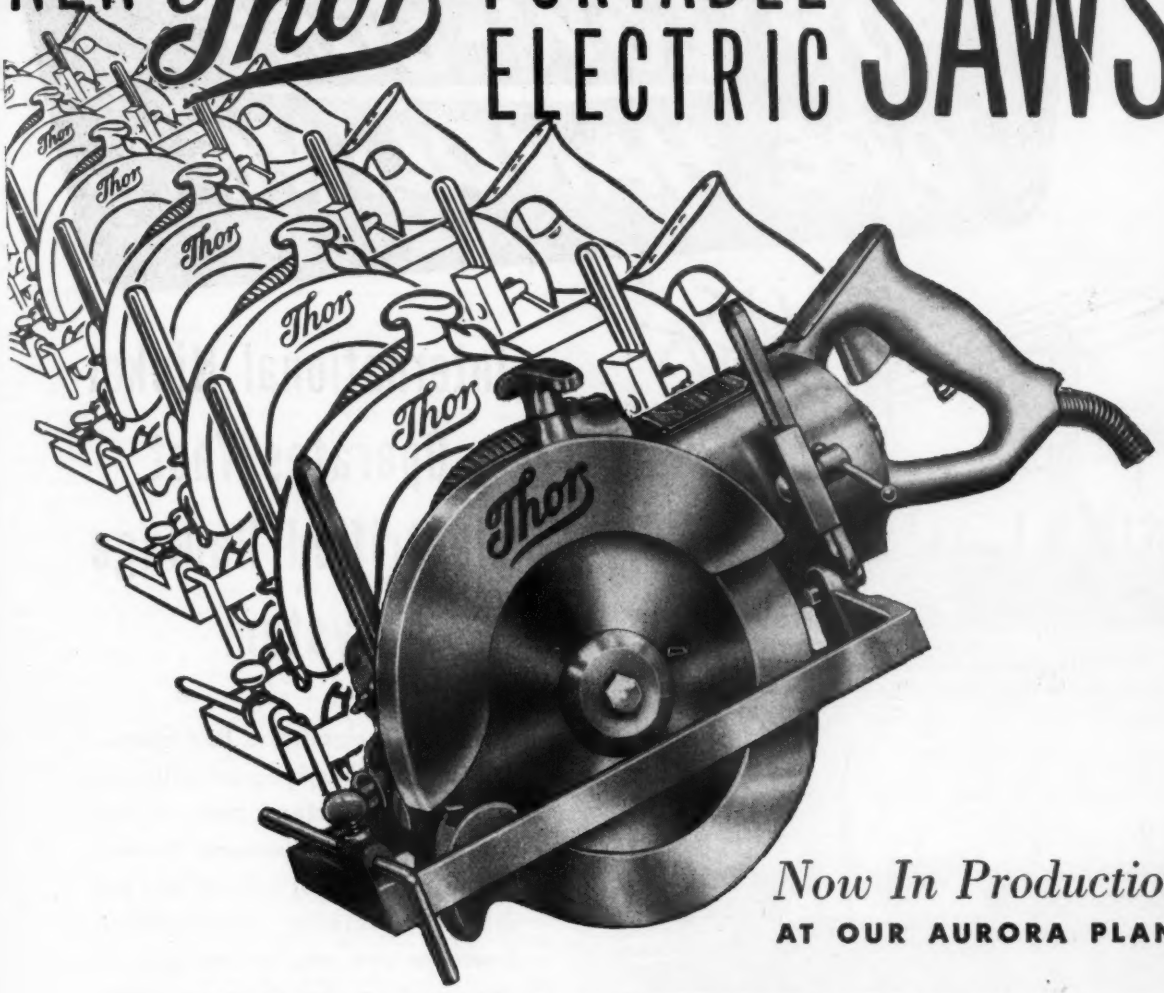
is more than a word with us . . . it's our way of doing business.



* Specify a Cummins Diesel and you can depend upon prompt and competent service from a nationwide dealer organization. You can depend upon the Factory to stand behind that engine throughout its entire work-life. You can depend upon all this because with Cummins**dependable** is more than a word . . . it's our way of doing business.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

NEW Thor PORTABLE ELECTRIC SAWS



Now In Production
AT OUR AURORA PLANT

Here they come—*packed full of new tool features*—the new Thor Portable Electric Saws!

Now in production in volume for delivery through Thor distributors everywhere, these new Thor Saws are available in 6", 7" and 8" blade sizes for all types of cutting in wood or metal.

See these new Thor Saw features for yourself *now*—call your nearby Thor distributor for a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia
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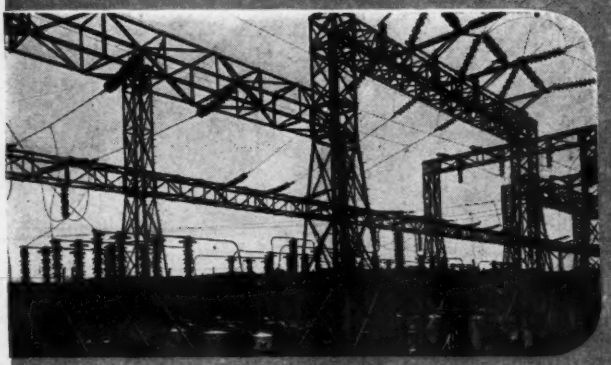
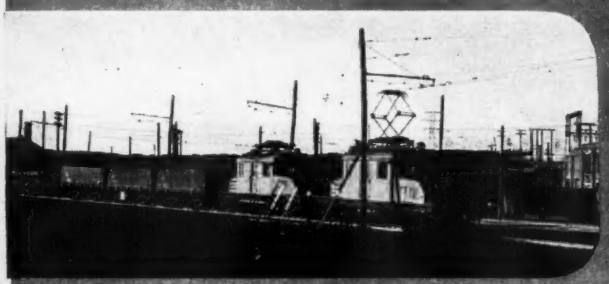
Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

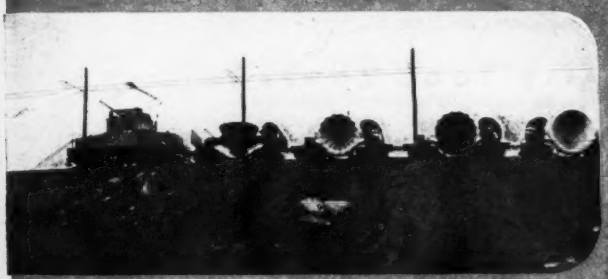
FOR LOW-COST ORE HANDLING...



O-B High-Voltage Insulators serve the main outside incoming power station at INCo's Copper Cliff Concentrator.



Powerful electric locomotives operating under O-B Overhead bring a trip of ore cars into the smelter yard. Electrified haulage is particularly well-adapted to the peaks and valleys experienced in smelter yard operation.



Electrified haulage extends to the International Nickel dump permitting low-cost slag removal, as well. Overhead structures are portable to facilitate movement as operations extend, and are equipped with O-B Trolley Line Materials.

International Nickel Operates Vast Electrified Haulage System

We think it significant that electrified haulage has been permitted to play an important part in the operation at International Nickel where millions of tons of ore are moved annually... ore which produces over eighty per cent of the world's nickel, large quantities of copper and sizable amounts of silver, gold and platinum metals. We think it further significant that O-B Line Materials, Rail Bonds and High-Voltage Insulators have been used throughout the INCo system, contributing to its transportation efficiency.

2712-B

O-B Line Materials

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ontario

Mining CONGRESS JOURNAL

Published for the Entire Mining Industry by The American Mining Congress

JULIAN W. FEISS, Editor

Volume 32 OCTOBER, 1946 Number 10

THE RIGHT TO STRIKE

IN HIS address before the Congress on May 25 of this year President Truman emphasized the gains made by organized labor since 1932 and stated that the "right to strike" should be preserved. Since this "right" has been recognized by the President of the United States as basic and since the term is used repeatedly by labor leaders and officials high in Government circles in Washington, let us see first how this doctrine is influencing the welfare of the country, and second let us examine its origin.

At the end of September, Pittsburgh was threatened by a power strike by an independent union of power workers. Mayor Lawrence, acting for the good of the public, obtained a court injunction from the State of Pennsylvania against the strikers. The AFL and CIO, with an ironic sense of civic responsibility, came to the rescue so that the situation was further complicated by the threat of sympathy strikes; some of which actually took place. Badly frightened, the city authorities had the court withdraw its injunction in an attempt to appease the strikers but this move was fruitless. The strike went on.

By October 1 the Pittsburgh strike had cost an estimated 125 million dollars in business, industry, and pay-roll loss. Seventy thousand workers were idle in an 817-square-mile area and by October 2 the city was threatened with a complete blackout in all electric lighting. By evening of the same day it was announced that all downtown business establishments, hotels, eating places and theatres would be closed because of lack of steam heat.

In Pontiac, Mich., 75,000 people were living in a fetid atmosphere of filth throughout the month of September. Local 100 of the CIO United Public Workers was demanding a pay increase from the taxpayers. Garbage was piled in back yards, refuse cluttered the sidewalks and bodies awaited burial at the morgues.

The ultimate cost of such strikes is difficult to calculate; it is possible that there is no way of measuring the results on a dollars and cents basis. The debt is paid by the public through increased mortality, the visitation of epidemics, the wrecking of municipal government.

In a situation such as that of Pittsburgh, the injustice of our present labor laws is only too evident. Imagine what would happen if the power company were to demand higher rates. Were the directors to order a shutdown to enforce their request for such rates in opposition to a court injunction they would face jail sentences within 24 hours.

Irrespective of the effectiveness or advisability of the injunction as a legal weapon, why should labor and labor alone be granted rights denied other segments of industry?

Why should organizations of employes exercise monopolistic control over the essentials of our economic existence when similar action on the part of employers is outlawed under the anti-trust acts? Finally, why should labor be granted rights above the laws of the land—rights denied the balance of our population?

Today the "right to strike" has usurped the rights of the people. By sanctioning this doctrine, extolled as a guard against involuntary servitude, our Government has granted a monopoly not only to those who can wreck our governmental structure but to men who can endanger the physical well-being of the citizenry. The racketeer, the thug, the "fellow traveler" and the irresponsible labor leader can with Government sanction stop the wheels of industry and shatter our social and economic system as easily as a conquering army.

What is the origin of this new right, the "right to strike"? As the phrase is used today one assumes that this principle is a fundamental concept of our governmental structure, so fundamental in fact that it requires no legislative sanction. Certainly there is no mention of this right in our Constitution or in the Bill of Rights nor do any of our subsequent constitutional amendments clarify this questionable "right." In fact, we find that during one period of our recent history heavy penalties were imposed on labor leaders who fomented strikes, this penalty applying under the Smith-Connally Act of 1943. Apparently there have been times when this "right to strike" was not considered basic. Actually it is only a qualified right, which ceases when the welfare of the population is molested. A staunch supporter of labor, the late Associate Justice Louis Brandeis, has stated in one of his opinions delivered before the Supreme Court: "A strike may be illegal because of its purpose, however orderly the manner in which it is conducted. . . . Neither the common law nor the Fourteenth Amendment confers the absolute right to strike." This opinion was unanimously concurred in by the entire court.

The right to strike is a myth. It is obvious that when labor, or any other group for that matter (and this would include the employer), assumes the right of determining the destiny of a large segment of our population, it is usurping the basic right of government. No civilized society can endure under these conditions, and today we are seeing at Pittsburgh and Pontiac the end results of a past Government policy dedicated to the principle that labor can do no wrong. The "rights" of the strikers have been recognized but what about the rights of the people of Pittsburgh and Pontiac? The so-called "rights" that have been granted labor have not been balanced by the imposition of equal responsibility to the public. The Federal Government has permitted leaders of organized labor to be the sole judge of their own conduct.

The day has arrived for legislation to outlaw strikes against the people and their Government, against employers not involved in the dispute at issue and against strikes by a combination of unions to tie up an entire industry or industries. Unions and their officials and agents must be made subject to the anti-trust laws and be made sueable as legal entitles in the courts. Thoroughgoing revision of the Wagner Act to restore true collective bargaining and to create equality of status between employes and employers is essential.

The time has come for our Government to reassume its responsibilities. The blame for our present chaotic state lies in Washington, where Government leadership in evading political embarrassment has permitted an organized group to challenge the rights of our citizenry. Before it is too late, those in high authority would do well to recall the words of Henry Clay, who stated in a speech at Ashland, Ky., in 1829, "Government is a trust, and the officers of the Government are trustees; and both the trust and the trustees are created for the benefit of the people."

National Mineral Policies

By HON. J. A. KRUG
Secretary of the Interior

Secretary Krug addresses a luncheon meeting of the American Mining Congress at Denver. Seated (left): Hon. Clair Engle, U. S. Representative from California; (right) Hon. Joseph C. O'Mahoney, U. S. Senator from Wyoming, who introduced Secretary Krug

MR. CHAIRMAN, Senator O'Mahoney, members of the American Mining Congress, ladies and gentlemen:

I think that I should say, Senator, if I can do as good a job at bringing industry and government together during my term as Secretary of the Interior as you are doing in the United States Senate, we will look forward to a great period of making democracy work, at least in the Department of the Interior.

I am very happy to be back here in Denver today and for this opportunity to address the American Mining Congress. I know this is the greatest meeting of the Congress. I hope no one will take that back to Los Angeles because if you do, they will say: "He will say the same thing when he comes out here." Anyhow, I recognize the American Mining Congress as the solid, substantial core of our great American mining industry, and it gives me pleasure to come here. I have the deepest respect for every member of this Congress.

I would like to talk briefly today on how I think our American democracy can work in the mining industry. I am sure that all of us are convinced of the superiority of our political system. We know its advantages over the Japanese and the German systems referred to by Senator O'Mahoney. Now with the official records of the German and Japanese governments available, we are able to study the systems of our defeated enemies. Regardless of their limitations in other respects, we have found astounding evidence of their planned and successfully executed program for the maximum use of their mineral

resources in providing for a full and balanced industrial economy.

We Americans are convinced of the superiority of our political system. We know its advantages over the totalitarian systems defeated in the long and bloody conflict of the last six years. Now, with the official records of the German and Japanese available, we are able to study the degree of organizational efficiency of the defeated powers. Regardless of limitations in other respects, we have found astounding evidence of their planned and successfully executed programs for maximum use of mineral resources to provide the basis for a full and balanced industrial economy.

During the past year American experts have been sifting the meticulous German records to find out what made the German war machine tick and now have complete information on long-range German plans for economic development and diversified uses of mineral resources. The Germans had an industrial set-up so precisely and coherently arranged that each unit of production, processing and manufacture, fitted into a logical structure. Every mineral deposit in Germany had been charted, prospected, estimated, and finally *used* to the limit in a desperate effort to stave off defeat. Moreover, the versatility of many minerals was increased, and even that prima donna, coal, gave birth to dozens of useful, yes, vital commodities ranging from aircraft fuel to butter.

This was the efficiency of the Nazi economic system. This was the enemy we had to face. This is the kind of enemy we may have to defeat in the future. With far more limited mineral resources, they had a solution for the problem of maintaining a strong industrial economy.

Their solution, however, was in spite of, not because of their political system. It was a solution imposed from the top—one issued as an order to underlings.

We have a serious minerals problem in this country today. We can achieve a better and more permanent solution than the Nazis did by our own method of individual freedom, with cooperation from top to bottom, mutual understanding and general agreement on principles and practices.

The Problem of Mineral Reserves

There has been much debate during the past two years concerning the seriousness of the mineral reserve situation. Opinions differ widely, especially on the reasons for the current situation. Whatever the ultimate answers to the myriad of questions that have been raised, these debates have served a useful purpose. They have smoked out opinion and have helped to clarify the thinking of those whose job it is to do something about the situation. People in the industry and in government are all conscious of the fact that the problems of the mineral industry are problems of grave national concern. We know that we are dealing with wasting assets, which man can exploit but cannot replenish. We know that the reserve situation cannot be taken for granted and that the quantities of minerals available are finite and exhaustible. We all recognize that adequacy in mineral supplies is no longer simply a matter of having ample amounts of iron, copper, lead, and zinc. In this age of alloys and special products, industrial self-sufficiency demands supplies of scores of other minerals which, though sometimes small in tons, are mighty in what they do for the industrial machine.

Out of our recent discussions have also come some noteworthy agreements. *First*, that the current reserve situation in several highly significant segments of the mineral industry is unsatisfactory from the standpoint of national requirements. *Second*, that present trends indicate greater demands for minerals and metals than ever before in the peacetime history of the nation. And, *third*, that while the demands have continued to rise—the rate of discovery of most minerals has fallen off sharply, so that in recent years we have been using up ore supplies faster than we have been finding them. The rise of American industry is measured by mineral discovery, development and the staggering extent of mineral production. Now the time has come when prudence demands that we take inventory and realistically plan the method of filling vacant or half-filled shelves.

Government Policies and Replenishment

If we are to get on with the job of replenishing our mineral reserves, uncertainties as to governmental attitude and regulations must be ironed out and kept at a minimum. Policy dealing with these matters must be based on fact. It must be fearless and forceful; for the problems involved are complex and the clash of interests manifold.

Such a policy must have universal understanding and endorsement. No one person or group can satisfactorily devise it. The problems involved are too numerous, too diverse in technical nature, and too interrelated in political aspect. The legislative and executive branches of the Federal and state governments must work together in creating mineral policy. In this they will need and must have the advice and cooperation of the industry. The cardinal points should be laid down for discussion and suggestion. Some of our pet theories and what may seem to be our best personal interests may in some instances have to be compromised. I am confident that the industry will participate and cooperate wholeheartedly in formulating and implementing such a policy.

When I say industry must give its advice and cooperation, I include all segments of the industry—management and labor, mine foremen and stockholders—all of the diverse interests and elements engaged in prospecting, exploring, mining, smelting, refining, processing and marketing. We are all in the same shaft car together and we either go up together or down together.

Our main purpose is to devise means to assure the United States minerals sufficiency for all purposes and under all circumstances.

The prime requirement of such a program is that we do all in our power to maintain a healthy, going mineral industry at home—one that is outstanding for its technical knowledge and skills, one with an adequate reserve position, and one with ability to expand rapidly in case of emergency.

Our war experience showed us clearly that the best place to have mineral deposits in times of national emergency is within the bounds of the United States. It also showed that even though we start with a strong, vibrant industry, well endowed with technical knowledge, grave difficulties attend any program of rapid expansion.

Without the advantage of a strong industry we would indeed be handicapped. We must, therefore, maintain this advantage.

Federal Agencies Should Aid Exploration Program

As a step towards accomplishing this, I suggest that domestic operators be encouraged and enabled to prospect for and develop new resources. They must also be encouraged to devise ways of profitably treating material now considered useless. There are still undiscovered mineral deposits of great wealth within the United States. However, the task of finding new deposits is beset with more and more difficulty and involves greater and greater financial risk. I believe, therefore, that the Federal government is obligated to assume a larger share of this risk. Through such agencies as the Geological Survey and the Bureau of Mines, it should expand its program of basic research in mineral exploration, mineral development, utilization and conservation; functions which by virtue of the national scope and experience of these agencies they are particularly well qualified to perform.

We of the Department of the In-

terior are now devoting much study to this aspect of the problem, with the aim of further defining these functions. We want to see where our present set-up falls short and where we can improve this kind of service. We know that industry has done and will continue to do, most of the work. In this respect, I am glad to note that these meetings have included a symposium on the functions of the Geological Survey in mineral exploration. Such an interchange of ideas between Federal agencies and industry is certain to have beneficial results.

Encouragement of domestic industry, search for new domestic resources and experimentation with improved methods of treatment are only parts of the problem. War production records coupled with those of previous years show clearly that in all too many categories, domestic deposits cannot supply all our growing needs for minerals and mineral products. For some minerals even our greatest optimists admit that the chances of finding adequate supplies are just about nil.

For example, we have long been dependent upon foreign sources for most of our supplies of antimony, chrome, manganese, nickel, vanadium, tin, tungsten, tantalum, mercury, platinum, certain qualities of asbestos, sheet mica, quartz crystals and a few others. Few people worried much about this group of minerals prior to World War II. After all, industry requires a relatively small tonnage of most of them. Their economy does not involve great sums of money in comparison with such commodities as iron, copper, lead or zinc. While the nation was at peace, the importation of amounts sufficient to fulfill our industrial requirements was simple. Their importation in time of war, however, proved to be a very difficut problem, one that we cannot well afford to overlook again. Now we realize how vitally important these substances are to our whole industrial economy. Our great machines and communications systems can be rendered helpless without them.

Increased Output Achieved to Meet Wartime Needs

Immediately before and during the war government and industry made diligent efforts to find and develop more adequate supplies of these substances in this country. The results were in many aspects highly satisfactory. We succeeded, for example, in demonstrating that the country can produce all the vanadium it needs, if we are willing to pay the price. Important quantities of low quality chrome and certain qualities of manganese can be extracted from domestic sources, if we are willing to expend the money, manpower and equipment necessary to handle huge quantities of low grade material.

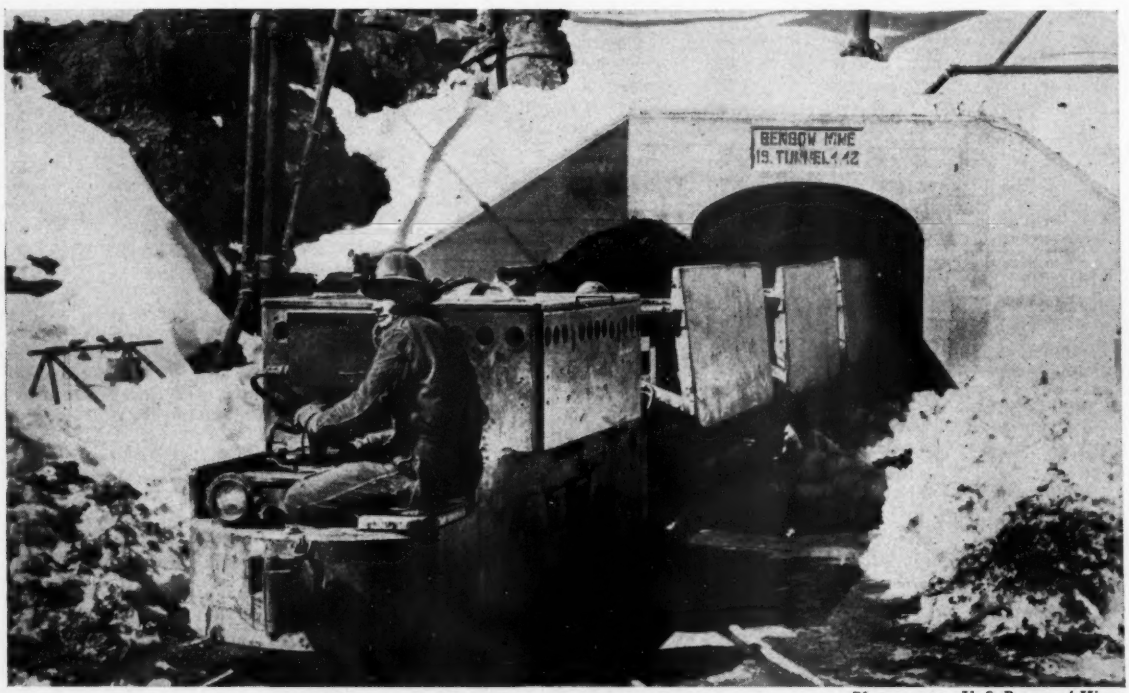
During war impetus, high prices and a noteworthy new discovery, we actually produced about three times as much tungsten during the war compared with the period just preceding. Domestic production of mercury was stepped up in about the same ratio. During the last two years of the war, domestic mica deposits yielded approximately 12 per cent of the total requirements for high quality sheet mica.

These feats were not considered possible prior to the war. They were accomplished by high pressure, high prices, and little thought as to the future of the deposits. These strategic mineral developments carried on during the war achieve a real purpose in that they alleviated shortages in a time of great stress. We also learned much that can be of use to us in a future emergency.

Despite all our efforts, we were unable even remotely to approach sufficiency in most of these critical materials. We were forced, during the war, to import 90 to 100 per cent of eight different minerals (asbestos, corundum, flake graphite, nickel, tin, tantalum, quartz crystals, beryl), and over 60 per cent of six others (chrome, mica, cobalt, manganese, antimony, tungsten). As we return to a peacetime economy, we are still largely dependent on foreign sources for each of these strategic minerals, and we are still entirely dependent on foreign sources for our total supply of specific qualities of many of them.

Stockpiling for Defense Needs

That Congress takes a serious view of this situation is shown by the enactment in July of this year of Senate Bill 752, *the "Stockpiling bill."* Most



Mine cars loaded with chrome ore emerging from tunnel —*Photo courtesy U. S. Bureau of Mines*

of the members of this audience are familiar with the provisions of this act. To those who are not, I suggest that you study it. Designed strictly for national defense purposes, it provides for acquisition of minerals on the "strategic" list. The minerals currently on this list are so numerous and the industrial use of them so heavy that the law will have a far-reaching effect upon the economy of the entire mineral industry.

The bill states that "the natural resources in the United States being deficient or insufficiently developed in certain strategic and critical materials to supply the industrial military and naval needs of the country for common defense, it is the policy of the Congress and the purpose and intent of this act to provide for the acquisition and retention of stocks of these materials within the United States and thereby prevent wherever possible a dangerous and costly dependence of the United States upon foreign nations for supplies of these materials in times of national emergency."

The Secretaries of War, Navy and Interior acting jointly through the Army-Navy Munitions Board are directed to determine from time to time what materials are strategic and critical. Purchases shall be made through the Procurement Division of the U. S. Treasury.

Obviously, if we are to implement and administer this act wisely and effectively, it will be necessary to make a complete and continuing appraisal of the domestic reserves and of the capacity and needs of industry. Great harm could be done through action without proper factual knowledge.

For example, what amounts of what mineral commodities should be bought in foreign markets, and in what ratios to domestic purchases? How much effort should be expended in attempts to improve our domestic supply situation, and what are the chances for success? How rapidly can we expand production and to what extent and for how long can we rely upon domestic sources if we have to? What changes would industrial practices have to undergo in the event that we should have to resort to material of the quality and character available to us from domestic sources?

Some Minerals Must Be Purchased Abroad

In the case of those minerals of which we have none or next to none, the immediate course of action is clear. We must buy abroad and at the same time foster research in domestic substitutes. But what should be our policy with regard to those minerals that under high subsidy or high tariff could be amply provided from domestic sources? Should we buy American? Cases will undoubtedly differ, but on the whole I believe we should reject the idea of forcing domestic mines to produce more than that needed to maintain the domestic industry at a healthy level. To do more would be to strip such assets prematurely at a high cost to the American taxpayer, whereas to do less would allow the industry to atrophy.

There will be borderline cases in which the government will have to assume a considerable share of the responsibility for exploration and development of new reserves of mineral substances that are in scarce supply. The government must also help in the search for processes whereby deposits that are presently marginal or submarginal can be utilized if needed. Industry cannot shoulder the entire responsibility for this or be expected to invest in ventures except where there is reasonable chance for profit. The opportunity for a continuing profit from exploitation of domestic reserves of certain of the strategic minerals is apparently somewhat remote. For security reasons on the other hand, the government cannot afford to let the development of critical minerals languish.

We should not hesitate to purchase abroad ample supplies of any materials needed for our internal economy which cannot be produced from domestic deposits under reasonable protection. Indeed, I believe we should encourage American industry to extend its operations in foreign fields as a means of assuring the United States adequate supplies of materials in which we are deficient. Foreign expansion is one method by which the industry is strengthened. Already the stronger units of the American mining industry are deeply entrenched in foreign fields in such commodities as copper, lead, zinc, gold and petroleum. Why not in tin, tungsten, chrome or other essentials? We must have these minerals, and judged from the record, the chances of maintaining other than a standby domestic mining reserve of some of them are far from rosy. I believe, moreover, that foreign expansion can be achieved without affront to any other nation.

At the same time, we must also diligently seek for more adequate domestic sources of supply, for this is the safest place to have supplies. Stockpiling will afford us a breathing space, but a stockpile after all is like a savings account—something to tide us over a rainy day, but not as dependable as a sole and continuing source of income.

In discussing this problem of adequate and sound United States mineral development, I am aware that some people will feel I am operating outside the proper field of government. To say that the Federal government should not take active measures to assure a sound mineral policy and program in this country is as silly as to say, as did the Germans, that the government should make all the decisions. In our political system, each institution contributes to the solution of our problems. I can assure the minerals industry that it is not the policy of President Truman, or the Secretaries of War, Navy or Interior, or anyone else in the administration, to take over the minerals industry. We are convinced that the maximum development and the best job for the country will come in continued and encouraged private ownership and development of our mineral resources.

In the interest of the nation's welfare, let us join in drawing up a plan of action for a strong American mining industry; guaranteeing an adequate supply of mineral resources for industrial needs and national defense; and the best possible solution of the economic, legal and political problems involved. If we agree on objectives there is no reason why we cannot agree on methods of procedure to attain them.

* * *

Now, gentlemen, so much for my written speech. The main purpose of my coming out here to talk to you was to say that the Secretary of the Interior and the Government of the United States are willing to go more than half way in working with you on the national mineral policy and program. There will not be any decisions made behind closed doors and without consultation. We will strive diligently to work out a program in the best interests of the Nation.

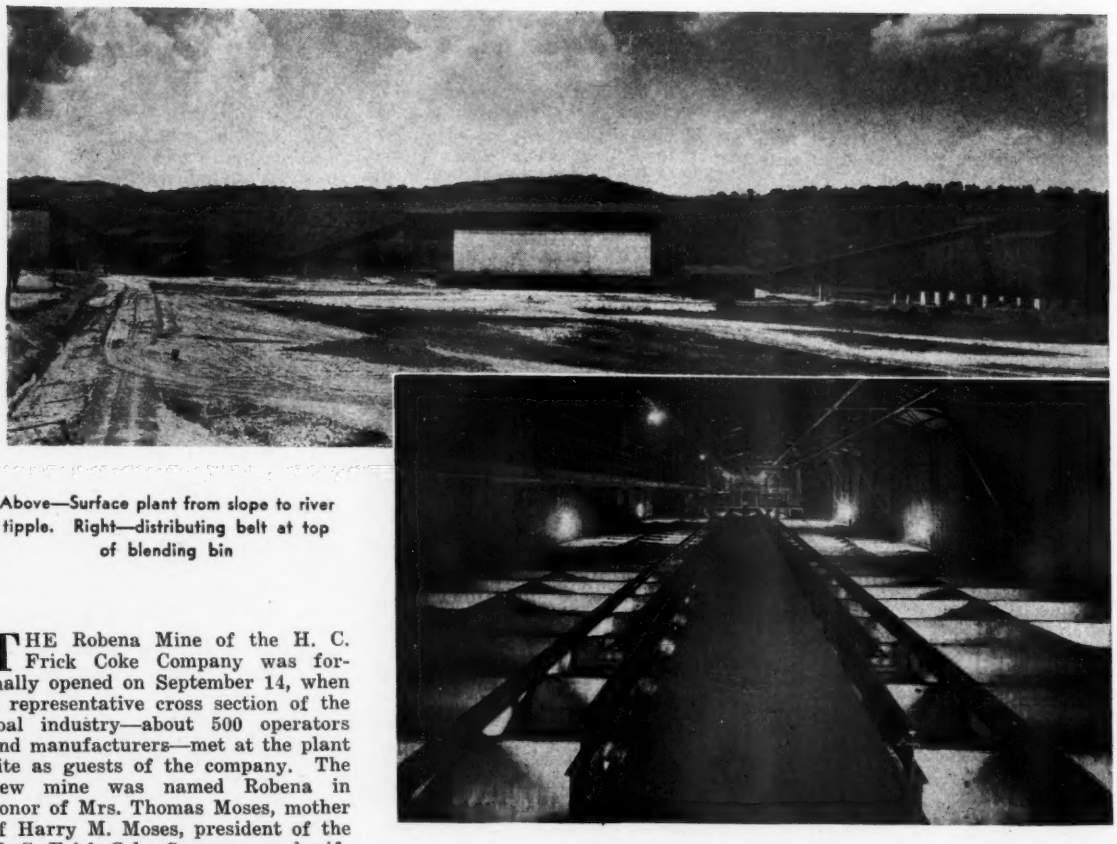
I have been criticized for trying to continue to work with industry in peace-time as we did in war-time. Regardless of that, I will continue to work that way because I think it is the effective, American, democratic way.

Before this great Congress closes, I hope that you men will appoint a small executive committee from your membership to work with me in promoting a practical course of action, to get the advice of your industry on all of these important questions of developing and establishing reserves of our natural mineral resources in which the Department of Interior has an interest. And I will try, in turn, to get your advice and counsel to the other departments of the government that have to do with various phases of this vital industry.

It is a great pleasure for me to be here, and I think that it is a great thing in our future that you men are working on your problems in sound confidence in the great American system which has brought us through a number of wars and is working out the harrowing problems of peace that we still have ahead. Thank you.

The World's Largest Coal Mine

H. C. Frick Coke Company Formally Presents Robena Mine to the Coal Industry

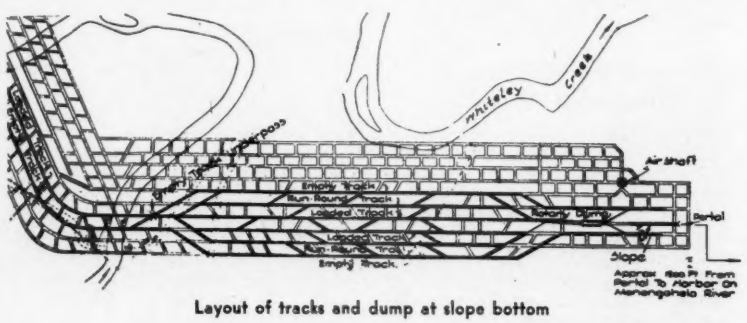


Above—Surface plant from slope to river tipple. Right—distributing belt at top of blending bin

THE Robena Mine of the H. C. Frick Coke Company was formally opened on September 14, when a representative cross section of the coal industry—about 500 operators and manufacturers—met at the plant site as guests of the company. The new mine was named Robena in honor of Mrs. Thomas Moses, mother of Harry M. Moses, president of the H. C. Frick Coke Company, and wife of Thomas Moses, former president, and retired vice president of the United States Steel Corporation of Delaware.

The opening of this mine represents an historic landmark in the development of the coal mining industry of southwestern Pennsylvania. For many years the Connellsville Basin of Westmoreland and Fayette Counties has furnished large tonnages of low sulphur coal which, under the general classification of "Connellsville coking coals," has won nationwide recognition as a metallurgical fuel of the highest quality. Anticipating the eventual depletion of the Fayette and Westmoreland County reserves, the Frick Coke Company acquired a 69,000-acre tract of Pittsburgh seam coal underlying Greene County. It is favorably located within 61 miles by river from the Clairton by-product coke ovens of the Carnegie-Illinois Steel Corporation, which will receive all or a major portion of the mine output. This output when the plant is completely equipped and operating at full capacity, will be 20,000 tons of prepared coal daily, which, it is believed, will exceed the output from a single mine opening, of any existing coal mine operation.

The new operation consists of two essential parts—a slope at the Monongahela River where the coal is brought from the mine to the surface and loaded into river barges, and a shaft about two miles away that will be used for ventilation and for hoisting men, material and slate. At this site there are the usual plant buildings—shops, offices, supply, bath and lamp houses. In addition there is a

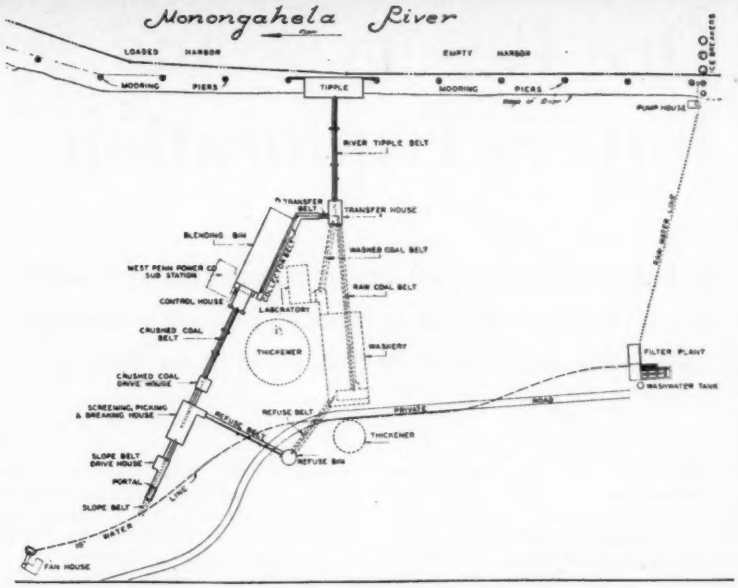


Layout of tracks and dump at slope bottom

large automobile parking lot for the employes, as this shaft is the main entrance to the mine workings.

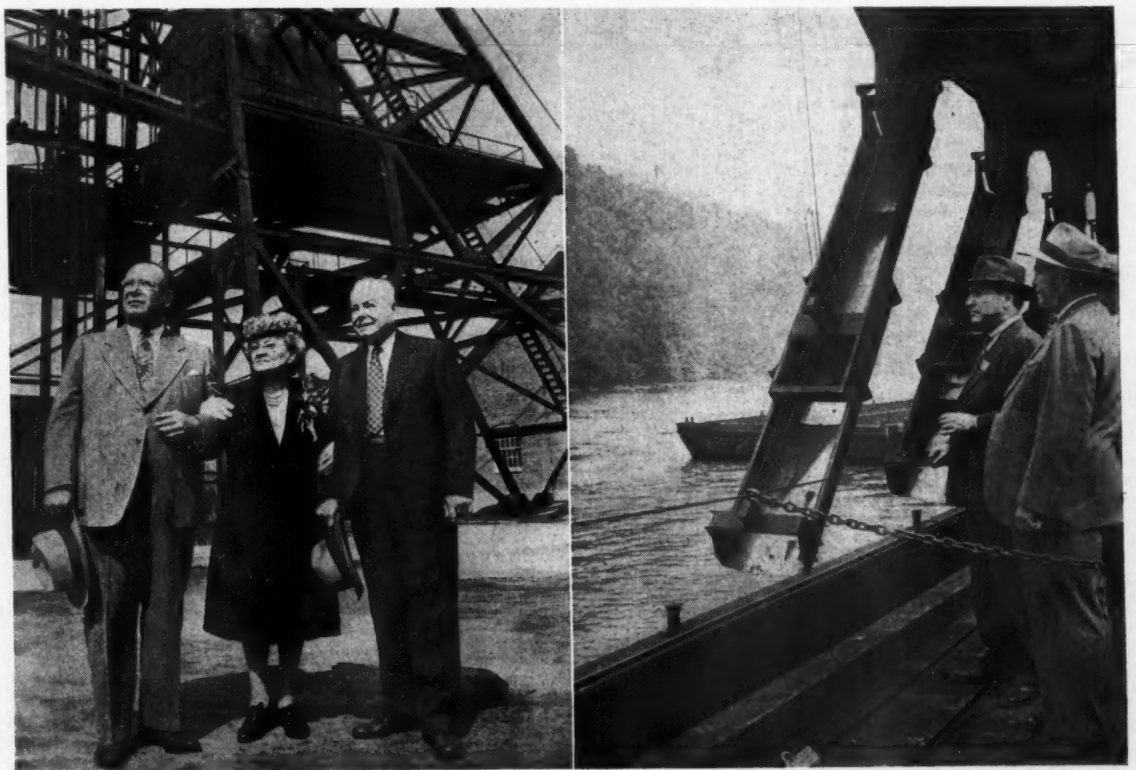
Coal is transported from the working face in 6-ton steel cars, hauled by electric locomotives to the slope bottom where two rotary dumps put the coal into a bin which feeds a 300-ft. belt leading up the slope to the surface. Each rotary handles 10 car loads at a time and this starts the first of several steps taken to blend high and low sulphur coals to insure chemical uniformity of this coal for producing metallurgical coke.

The entire output at the mine mouth is handled by an intricate system of belts. A 5-ft. belt conveys the product to the surface, thence to the top of a building where shaker screens, picking tables, and crushers are installed. Here, slate and other coarse refuse are removed and the coal is crushed to minus 3 in. A small, automatic sampler takes off test samples periodically. Then the coal is delivered by another belt system to the top of an 18,000-ton blending building, where a shuttle belt assembly distributes it into deep, concrete blending bins. This consists of 168 separate cells, each 7½ by 11 ft. in area and 56 ft. deep, holding 108 tons of coal. At present, the coal is moved from the bottom of these bins to the top of the river tipple into loading bins from which chutes empty it into river barges. The tipple has seven chutes; with all working, they can fill a barge with 900 tons of coal in less than six minutes.



Coal preparation plant layout

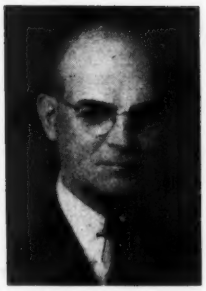
Under construction, close to the Robena dock, is a new coal cleaning plant. When it is completed, the mine product will go there before entering the barges and the raw coal, as mined, will be beneficiated by processes relatively new to the coal industry. At



(Left) Harry M. Moses, president, H. C. Frick Coke Co., together with his mother, Mrs. Robena Moses—for whom the mine is named—and his father, Thomas Moses, former president of the company and dean of the coal mining industry. (Right) Benjamin F. Fairless, president, U. S. Steel Corporation, and Harry Moses view river loading plant

Ore Reserves and Future Exploration

The Problem of Our Future Ore Reserves Is Receiving Wide Attention. Here a Constructive Program Is Presented Designed to Encourage Prospecting and the Search for Undiscovered Mineral Deposits



By RENO H. SALES

Chief Geologist
Anaconda Copper Mining Co.

THE status of our natural resources is a subject deserving most serious consideration and study. Wide differences of opinion have been expressed as to whether we are a "have" or a "have not" nation, with respect to certain important strategic minerals. It was not until World War II that the country began to realize the economic and strategic importance of some of the more common metals such as copper, lead, and zinc. However, the effect of the war on the ultimate reserve situation has been greatly exaggerated. It is true that mine development lagged seriously and the developed reserves suffered because of the shortage of labor, but the war excess production over normal output was not great enough to justify the claim that the war was responsible for the situation in which we now find ourselves. The war made a lot of people metal conscious and let us hope they will remain so. But even now I much doubt whether the users of metals, including manufacturers and the ultimate consumer, have more than a vague understanding of the importance of metal reserves, or what the mining industry means to them. A campaign of education is needed now as never before.

Soon after Pearl Harbor the Interior Department issued a pamphlet under the title of "War Program of the Department of the Interior." One of its announced objectives was to explore for copper, lead, and zinc in various states which were listed. On January 13, 1943, a year later, the then Secretary of the Interior, Harold Ickes, publicly expressed himself as not being greatly alarmed over the exhaustion of our natural resources provided that "the necessary steps are taken to ensure that as a given mineral resource is depleted, other mineral resources are developed which will take its place." A safe, conservative statement, no doubt. But two years later, in March, 1945, in a magazine article Secretary Ickes wrote, and I quote: "The prodigal harvest of minerals that we have reaped to win this war has bankrupted some of our most vital mineral resources." He seemed particularly depressed about certain strategic metals as indicated by the following statement, quote: "But of such vitally necessary minerals as copper, lead, zinc, tin, nickel, and chromite, little is left." He also referred to the United States as a "have not" nation.

The President, in his message to Congress September 6, 1945, gave official warning that certain of our strategic metals were badly depleted. From the message I quote the following statements:

"At the same time our splendid prewar program to build up our national resources was sharply halted. The diligent and constant search for additional deposits of minerals was almost abandoned in favor of a frantic effort to discover and make possible the production of the material for war." And further he stated:

"We must develop for the use of industry new technologies so that the vast deposits of low-grade ores that have not heretofore been considered usable may be put to work for the good of all of us."

I disagree with the President's statements above quoted in the following particulars: (1) The Government had no "splendid prewar program" or any program that I know of to build up our national resources, in fact, many of the activities of our Government toward the mining industry were having just the opposite effect; (2) the search for "additional deposits" was not abandoned during World War II, but on the contrary it was greatly intensified in the field by

Site of the San Manuel discovery, near Mammoth, Ariz.—a new big porphyry copper

the mining industry supplemented by the war program of the Interior Department, and (3) the expression "vast deposits of low-grade ores" may be applicable to certain metals such as iron, aluminum, and low-grade manganese, but it applies neither to copper, lead, nor zinc.

It must be kept clearly in mind that expressions from these high officials on natural resources are widely quoted, read and believed by our citizens in general. But there were instant and vigorous dissents from many members of the mining industry denying that we were a "have not" nation, and there may be more denials, supported by argument, put forth at this Denver meeting. However, the controversy will not abate in intensity for the present at least.

It is good to know that the Administration in Washington is informed, and that it has warned the country at large of the depletion of many of our known metal resources, but whether we are literally a "have not" nation, or that reserves are running short because we have not been diligent in our efforts to find additional deposits, is a debatable question. We must accept the fact that no new district comparable to Butte, Coeur d'Alene, Tri-State, Mother Lode or Bisbee, has been found in the past 40 years. Yet no one will deny that constant intelligent search for new deposits has been the order of the day in the mining industry and it was greatly intensified in World War I, also during the high price period in the late 20's, and through World War II. Whatever may be said of the merits of the pro and con arguments over the sufficiency of our reserves for future use looking beyond the immediate future, my own opinion is that a serious situation confronts our nation with respect to copper, lead, and zinc. One question before this meeting pressing for an answer is, what are we going to do about it? We need action, not argument. If we do not find more new deposits of copper, lead, and zinc in the next 40 years than were found in the last 40, the "have nots" will have won the argument. But first, we must not waste or throw away important reserves now in process of development.

In order to supply a basis for any suggestions I may have to offer as to what to do about the situation, I shall classify and analyze briefly the make-up of our reserves. My remarks will apply only to copper, lead, and zinc, and incidentally to gold and silver. I shall not deal with reserve tonnage figures or statistics related to life spans of specific mineral resources.

Under the broadest possible grouping we have two kinds of reserves:

Class A. Those we know about which support our going operations and which form the bases of the usual reserve estimates, such as that made by Elmer W. Pehrson for the Bureau of Mines.

Class B. Reserves believed to exist but which at the moment remain undiscovered and are therefore not measurable. These are the expected, or hoped for, ore discoveries upon which depends the future of our copper, lead, and zinc mining and associated industries.

For convenience and as a basis for discussion, I shall make a further breakdown of these two main classes.

Class A. Reserves We Know About

These include (1) the usual estimated reserves in operating mines or districts, and (2) estimated reserves in inactive mines or districts. They will be discussed in order.

(1) *Reserves in Operating Mines.*

The usual classifications are:

(a) Developed, or blocked out ore.

(b) Probable, or partially blocked out ore.

(c) Possible ore comprising lateral and downward projections of known ore bodies into undeveloped ground. The figure for total possible ore in any given mine reflects the optimism or pessimism, respectively, of the estimator.

(d) Marginal ore. At any given date under existing metal prices and production costs many of our mines producing copper, lead, or zinc contain an undetermined amount of so-called "marginal" ore. The tonnage of such material increases with every favorable change in the metal price-cost ratio, but decreases under an unfavorable metal price-cost ratio.

In general then, a mine having wide variations in grades of ore may have to withstand an unfavorable metal price-cost spread by mining proportionately more of its high-grade ore, which means gouging or "gutting" the property, a highly undesirable procedure from a conservation or any other point of view. Continuation of an unfavorable metal price-cost spread may force a mine either to stop production entirely, causing a total loss of reserves of every type or at best leave large quantities of "marginal ore" and the lower grade portions of the established ore reserve in the mines, all of which may be lost irretrievably in underground districts such as Butte, Park City, Tintic, Tri-State, Bisbee, and many others.

(2) *Known Reserves in Non-Operating Mines and Districts.*

There is no sharp line of demarcation between our operating and non-operating districts. In the class of non-operating mines, or I might call them "inactive ore reserves," I have in mind, for example, several isolated porphyry type copper deposits where substantial reserves of ore have been demonstrated by mine workings or by drilling and, although the grade is satisfactory, tonnages at individual properties do not justify, at normal metal prices, the plant capacity needed to make a profitable operation and at the same time return the capital investment within the life of the ore body.

Similarly, there are vein mines in many localities with measurable tonnages of ore, but inactive by reason of lack of transportation, reduction facilities, low metal prices, and so on; or their future ore possibilities do not appear attractive enough under existing metal prices and operating conditions to justify further development.

Obviously we are deceiving ourselves if, under normal metal prices, these isolated tonnages are added to our developed reserves in order to build up a showing of resources, but we may be deceiving ourselves to a much greater degree and more seriously if it be concluded that none of these small tonnage mines, or prospects, does not contain important undiscovered ore bodies. Past experience shows that big mines have grown from small ones, and I think we still have good reasons for having faith that history may repeat.

Class B. Undiscovered Deposits

Assuming their existence, no dependable estimate can be made covering ore bodies not yet found. Everyone is free to have his or her opinion, either optimistic or pessimistic, concerning these possibilities, but all will agree that opinions do not prove anything. Obviously it is of greatest importance to the nation that some of these reserves be uncovered in order to maintain future production. The sources of new ore upon which we must rely for new ores may be summarized as follows:

1. Undiscovered Deposits in Operating Mines and in Developed Districts.

It will be admitted that for many years past new discoveries of ore made from underground workings have played an important role in maintaining production and prolonging the life spans of some of our large districts. Bisbee, Butte, Coeur d'Alene, Park City, Tintic, Grass Valley, and Tri-State are well-known examples. The undiscovered reserves in districts of the above type may be in unprospected veins, or in undiscovered ore shoots whose tops range from 1,000 to 3,500 ft. or more below the surface. These deep reserves can be found only from existing mine work-

ings, because depth and the uncertainty of their existence makes unjustifiable the expense of sinking exploratory shafts from the surface. In districts exhibiting mineral zoning around a central source the upper limits of the ore bodies will be found at successively deeper levels outward from that central source. At Tintic, Park City, and Bisbee, where the ores are related to fissures or intersections of favorable beds by mineralizing fissures, the vertical range of deposition may be very great, and the ore bodies may be expected at locations of these favorable intersections regardless of depth from the surface.

The status of districts of the above type has not changed from the beginning. New discoveries have kept them going and at this very moment, whether he knows it or not, the ultimate consumer is depending upon additional discoveries in active mines for much of the needed metal. In my opinion, the undiscovered copper, lead, and zinc possibilities in and adjacent to our operating mines are much more important to us as a reserve, or from any other viewpoint, than the so-called low-grade deposits now idle and awaiting the development of new technologies. I venture to say that in Butte alone the tonnage of copper in "possible" and undiscovered ore bodies if and when developed, prove greater than the total copper in all of the known but at present inactive low-grade copper reserves in the United States.

But as we view these reserve possibilities in operating mines just referred to and their recovery, we should examine the unfavorable trends the operator has been facing. In the past 30 years wages have more than doubled and the cost of equipment and supplies have greatly increased. Mines have deepened attended by higher development, ventilating, hoisting and repair costs. Managements, both mining and metallurgical, and equipment manufacturers, have accomplished much to meet these adverse trends and there were hopes of success until the gains they had made were nullified by Federal taxes, laws, and regulations, and I might add I regret to say, fairly successful attempts to destroy the traditional good human relations between the miner and his employer that had existed from the earliest days of mining in this country. But through all this, and up to the start of World War II metal prices remained low or were forced down upon any or every occasion.

In this situation the most important question is, how are we to make sure that we ultimately recover the maximum production of ore and metal from our known measurable ore reserve, and that we find and mine all of the commercial ore existing, whether now known or undiscovered, in a given mine or district? We might just as well get down to realities. Under good management supported by technical skill of a high order, it can be done only under sustained metal prices high enough to insure a favorable metal price-cost spread. By that I mean a price that will take care of all operating costs, including taxes, and leave not only a fair rate of return on capital invested but in addition will provide funds for doing the prospecting and development required to find and produce that last commercial ton of ore in the property. The price must be sufficient to provide also the capital needed to prospect and explore for new deposits in other localities to replace those being exhausted. Possible remedies, including tax reforms by which the metal price-cost spread can be more favorable to the mine owner will be presented at this meeting by qualified speakers.

2. Undiscovered Deposits in Known Prospects and Small Mines.

These are the expectant ore bodies of the prospector which cause him to have an abiding faith in the future of his property.

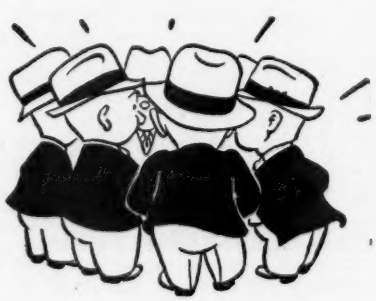
Most of our big mines and districts grew from small ones. Just as always we will have to depend in a large measure upon the prospector for our mineral discoveries in unexplored portions of the United States and Alaska. But the ground has been well gone over and there are thousands of mining locations upon which little work has been done. The early day type of prospector is almost extinct in the United States. His place must be taken by men with a good knowledge and understanding of rock formations and the geology of ore deposits, including rock alteration and mineral zoning. There is need for, and I believe reward awaiting, that type of prospector who will tramp the hills with pick and pan, just as is now being done in Canada with success.

But what of the thousands of known prospects including the so-called small mine? Needless to say the great majority are duds, or are not promising enough to attract development capital. However, most any one familiar with the geology of ore deposits will hazard the prediction that out of the list of known prospects one or more, perhaps many, will grow eventually into important mines if developed. At Mountain City, Nev., for example, the Rio Tinto outcrop, opened by tunnel in the 80's lay dormant for 45 years. The outcrop of the recently developed ore body at Yerington, Nev., was known and much prospected during the copper boom period of 1906-7. The new important San Manuel copper ore development within a stone's throw of the mining camp of Mammoth, Ariz., had a small surface showing of only a few hundred square feet of copper stained rock. These are excellent examples refuting the argument that we are a "have not" country and that there are no prospects left worth spending money on.

The question arises, if some of these prospects have promise, what can be done to encourage their further development? Prospects are made into mines by an individual, an association of individuals, by small mining companies organized for that specific purpose, or by going mining companies. Some say the status of our known prospects is such that only large companies are strong enough to do the work necessary to prove the existence of an ore body. This is not the fact. A small company found the Mountain City deposit, and a small company could have demonstrated the presence of the Yerington ore body. Similarly the first few drill holes at San Manuel indicated the probable existence of a worth-while copper deposit.

The small mine operator needs help through tax reforms. The Treasury "take" from capital gains should be abolished or held to a low rate until at least a substantial part of the investment has been returned. Money spent for prospecting and development should not go into capital account. The whole tax set-up should undergo revision so as to give encouragement to those trying to bolster our ore reserve situation. Security Exchange regulations should permit honest endeavor to finance prospecting and development ventures.

The small mine owner desires and insists that he run his mine free from government interference through bureaus and boards. He objects to being bound by wage rates fixed by national union heads or by government. He wants to be his own bargainer with his own men. He wants and deserves any outside help the government can give in building trails, roads, and dams, and a more liberal attitude from the Forestry Department. If the government is to continue giving aid through diamond drilling or other means it should be under the direct supervision of the Geological Survey. The proper plac-



ing of test drill holes on a prospect or in a small mine so as to get the most for money spent, is a difficult assignment even for the experienced geologist. The mine operator deserves what his metals are worth to the consumer, and prices should be sustained at levels high enough to insure continuous production.

Until some of these wants and needs are satisfied there is little use urging the prospector or the small mine owner to "explore our country more extensively than ever before."

3. Undiscovered Reserves in Hidden Deposits.

It is an oft repeated remark that there must be large reserves of metals in deposits hidden beneath the wide expanses of mountain slopes and valleys covered with detritus and alluvium. There are those who believe we can rely upon these unknown and undiscovered deposits to supply much of our future needs. But even if we assume the existence of such deposits their discovery presents an extremely difficult problem under the present status of our prospecting technique.

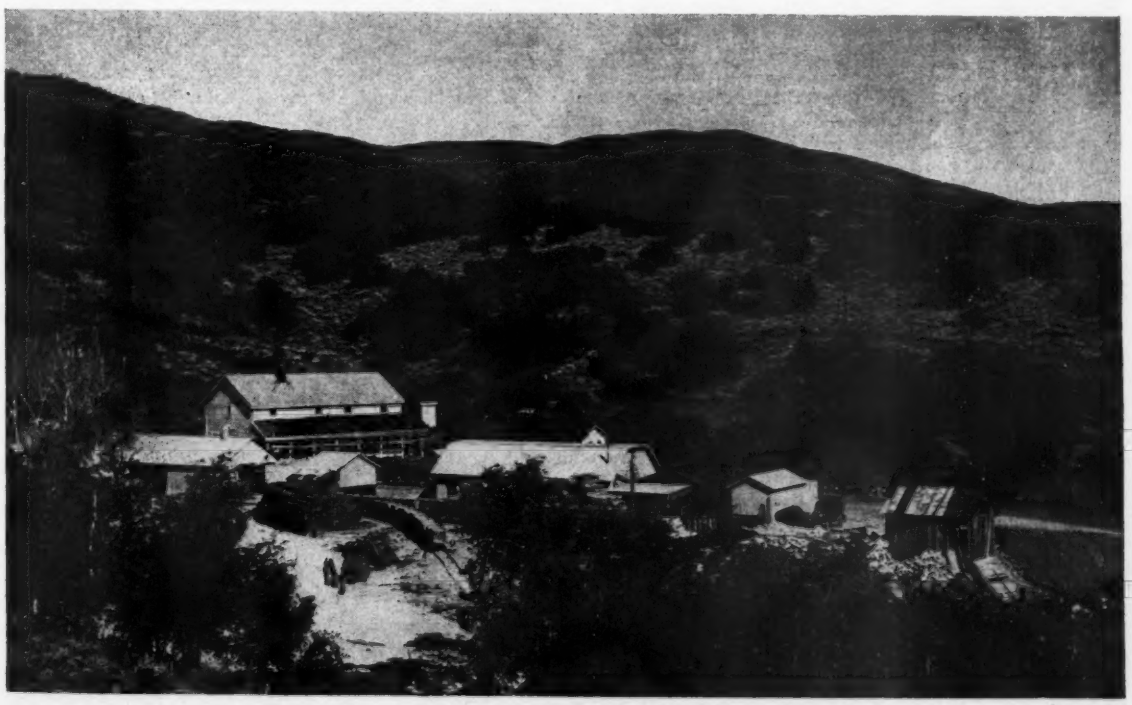
Ore deposits of copper, lead, and zinc, occur in solid rock formations. The eroded surfaces of rocks in our mountainous regions may be bare, an ideal condition for the prospector, or be hidden, speaking in general terms, by any of the following four types of covering:

1. Soil, or detrital material which has not moved far from place of origin.
2. Broad expanses of fanlike detrital covered slopes extending from the walls of hills or mountains downward toward the nearest valley drainage, at a dip of two to four degrees from the horizontal.
3. Lakes, or lake beds, conglomerate, alluvium, soil, or other outwash material, occupying valleys and large areas of land between mountain ranges.
4. Post-mineral volcanics including extrusive rhyolite, dacite, basalt flows, ash beds, tuffs and breccias.

Any one familiar with our mountainous western states can recall to mind large tracts in which there are no mining activities. It is easy to say that these vast unsettled regions contain hidden mineral possibilities awaiting discovery through improved prospecting technique. But let us not forget that included in these areas are mountains, hills, and valleys, which can be definitely eliminated as possible sources of mineral discoveries. Range after range is composed of unmineralized volcanics. Others have been proved by prospectors and geologists to have no mineral possibilities. Slopes outward from these barren ranges will never attract serious attention. Large portions of our mountainous states are valley lands too deeply covered by lake beds, water-soaked valley fill, basalt or other volcanics of types 3 and 4, to offer the faintest hope for mineral discoveries.

But there is a brighter side to this picture. There are many mountain ranges and hills disclosing the presence of mineralization, fissuring, contact zones, rock alteration, granite or other favorable igneous complexes, from whose sides detrital covered slopes, or pediments extend outward for long distances toward drainage valleys. Thousands of square miles of such pediment areas have received scant consideration. By the term pediment is meant a detrital covered solid rock basement formed by erosion leading outward from the irregular line of contact between mountain side and outwash slope.

In final analysis, however, future prospecting for hidden deposits in the western United States will be confined chiefly to mountains, hills, and pediment slopes. The detrital covering will present a serious handicap just as in the past, but the field will be considerably enlarged if and when geophysical or other prospecting equipment attain a higher degree of usefulness. Pediments in mineral localities offer prospecting possibilities because of the relatively thin detrital covering, and also because of the fact that the material comprising the covering may not have migrated far from its place of origin, a factor of much importance to the prospector who



Mayflower tunnel of New Park Mining Company, Park City District, Utah

looks for "float" or "rusty" soil discoloration to guide him to mineral concentrations.

In general, exploration for hidden deposits by drilling, shaft sinking, or geophysical survey, is too costly for the normal type of prospector. His pick and pan will prove to be of little service. But a good many things can be done to encourage prospecting. Among these are:

1. Establish laws or regulations which will permit mining locations to be made and held for a period of time upon lands having no outcroppings of veins or solid rock surfaces. Such a law should define the maximum acreage per claim; the mineral rights attached thereto; and the amount of annual assessment work in excavation or drilling, necessary to hold the claim until a mineral discovery is made.
2. Continue efforts to perfect geophysical instruments and other types of prospecting equipment. In anticipation of improvements in geophysical instruments our mining laws should make it possible for a prospector to take out a limited time prospecting permit covering a considerable acreage. Within such time limit, claim locations could be made, if desired, covering selected ground within the permit for drilling or testing by other means. The suggestion recently advanced that a geophysical survey be made a primary requirement for holding a single mining location is wrong because of the high cost of such survey, and for the further reason that except in rare cases, the existence of a mineral deposit cannot be proved by geophysical instruments in their present state of development.
3. Develop the art and use of aerial photography, particularly color photography, to expedite the mapping of geological formations, faults, and evidences of mineralization.
4. As a practical aid in the search for hidden deposits it is recommended that the United States Geological Survey not only intensify its field work, but give serious attention to the subject of pediments in anticipation of favorable developments in geophysical instruments and prospecting methods. An outline of pediment areas on geological maps covering regions or limited areas having mineral possibilities might prove very helpful.
5. Encourage laboratory research covering ore deposits.

Butte, Mont.—beneath the "richest hill on earth" are no doubt many still undiscovered ore bodies

Conclusion

It is my opinion that the "must" course of action for our nation is one that will insure continuance of operations in our important mines and mining districts until all ore obtainable within a reasonable metal price limit has been exhausted. The marginal, possible, and prospective ores of these districts far transcend in importance at the moment the so-called "vast unscratched resources" awaiting discovery. We should not sacrifice our best prospects on the theory of finding ore bodies which may not exist. The lesson of 40 years of prospecting has taught us just that. At the same time everything possible should be done to aid and encourage the prospector, and the small miner because it is to them we must look for the original discoveries from which reserves are ultimately developed. There has been no demonstration as yet that our country is in the "have not" class.

Finally, let no user of copper, lead, or zinc, whether he be manufacturer, or ultimate consumer, be lulled into a state of complacency by those who advise that if and when our copper, lead, and zinc reserves are exhausted, we will import our needs from foreign countries. What foreign country, may I ask, and at what price? Most countries have been prospected except in remote or inaccessible regions. No one at this moment has good reason to expect that new important deposits in foreign lands will be found more easily than in our own. But assuming a build-up of foreign reserves, and that the time may come in the not distant future when our status will be that of a truly "have not" nation, import prices may be such as to make our present day metal prices seem ridiculously low.

This nation must preserve its mining industry as long as possible and maintain it at high standards of efficiency, which means the preservation also of our technical skill. We must protect also the interest and enthusiasm of the individual for prospecting, mining, and "striking it rich," built up since the day of gold discovery in California, and not allow it to die with this generation or the next. If we fail, those who will suffer most eventually, are the great manufacturing industries using copper, lead and zinc; and along with them that every-day American citizen known as the "ultimate consumer," who finds one or more of these metals in nearly every article of commerce designed to raise his standard of living.

Attractive surface plant buildings of white painted concrete tile

Mechanized Mining in Eastern Ohio

Rail and River Coal Company Has Completely Modernized Its Operations

By A. F. WHITT
Chief Engineer
and
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Rail and River Coal Co.

EASTERN Ohio has been mining coal for many years and is one of the older coal fields in the United States. But this field also has a future, being located geographically for rail and river shipment to the industrial Ohio Valley and to the Great Lakes and with its No. 8 seam suitable for steam and metallurgical uses and with favorable mining conditions.

No. 3 Mine of the Rail and River Coal Company is one of the modern operations in this field. It is located at Bellaire, Ohio, on the west bank of the Ohio River at a site originally selected for river shipment although at present all coal is loaded at the railroad tipple which is served by the Pennsylvania Railroad. It was first opened in 1904 and operated with hand-loading for a number of years; then closed down for a period during the depression of the early 1930's but was later reopened and conforming to the modern trend, its operation was changed from hand to mechanical methods. All work is now completely mechanized with mobile loaders for the entry development and self-loading conveyors for the room work, using shuttles, belts and mine cars for transportation, all of which will be described in more detail.

Physical Conditions

The No. 8 seam has a usual height of about 5½ ft. and is generally free from major partings except for a 1 to 3-in. slate near the center of the seam and a top binder of about the same thickness. When the coal is mined, both of these partings usually break into fairly large pieces so that they can be removed by hand picking either underground or at the tipple. Immediately over the coal there is a draw slate which may be anywhere from a few inches to a few feet in thickness. This draw slate is more than apt to come with the coal; at best it may stay up until a cut is taken out but after that it is usually found good practice to take it down as attempts to hold it with timbers are only moderately successful.

The seam lies fairly level—from 1 to 2 per cent—so the grades are light and neither haulage nor drainage is a serious problem. The top presents the greatest mining difficulty. Above the draw slate there is conglomerate shale and clay of from 5 to 10 ft. and over that is a limestone, which is of such strength and thickness that it is difficult to break except over large areas. Because of the general roof condition,

pillar recovery is not widely practiced in the No. 8 seam; however a fairly high percentage of the coal is removed in the first mining.

Mining System

The mining method follows the customary room and pillar system as used in this region, originally developed for hand loading but later modified for mechanical loading and conveyor mining. It consists essentially of wide rooms with narrow pillars that are not recovered and the general layout is shown in Fig. 1. In changing from hand to mechanical mining there have been some changes made in the number of headings driven; at present the main headings consist of a set of 8 entries, the face heading have 6 and the room heading have 5. All are driven 12 ft. wide; the main and face entries are on 40 ft. center and the room entries on 44 ft. centers.

The panels are developed by face entries, with room entries, under the present plan, driven to the right and left. These are 1,500 ft. long with rooms worked off both sides,—270 ft. long, 30 ft. wide on 40 ft. centers. As will be noted from Fig. 1 they are driven abreast in blocks, usually six rooms to a block although this number is varied occasionally. Between adjacent blocks one room width is left unmined which makes a solid coal barrier about 50 ft. wide. This, as demonstrated by the experience of a number of years in this field gives a favorable roof action for the usual overburden in this section of the state where the surface is quite hilly and the cover varies from less than 100 ft. to as much as 600 ft. in the tops of the hills.

The rooms are worked retreating, starting at the top of the entry after the headings have been driven to the panel limit and, as mentioned in the preceding paragraph are driven abreast in blocks of approximately six rooms. It will further be noted that the tops of the rooms off adjacent panels do not cut into each other but a small barrier is left unmined, separating the panels. This serves to sectionalize the ventilation. However, it will be noted that at the top of each entry, two rooms are driven completely through to the adjoining entry to serve as an emergency travel-way and bleeder entries entirely across the panel.

Operating Method

The mine is completely mechanized with mobile mechanical loaders for the entry development and duckbill loaders in the rooms. All work in entries is triple shifted but rooms are double shifted; four development units and three 10-room units produce an output of between 4,000 and 5,000 tons per day and complete three-room panels per year. In addition to the regular development operations, a Myers Whaley loading machine is used as "utility unit," driving air courses, manways, etc., and also loading slate falls.

The four units on heading development which as previously explained may be sets of 5, 6 or 8 entries, each has one Joy 14 BU tractor loader, one Joy 4-ton shuttle car, one Goodman shortwall cutter mounted on a caterpillar truck and one electric post drill. All of these machines use trailing cables. In one unit there has recently been installed a Sullivan 10 RU machine mounted on rubber tires; this operates as a bottom cutter and is proving very satisfactory.

The shuttles transport the coal for a short distance down the entry to a point where mine cars are placed in a trip for loading; this trip, at the present is moved as the cars are loaded by a locomotive using remote control operated by the car trimmer at the shuttle discharge point. The shuttle discharges into a "pit car loader"—an elevating conveyor by the Joy Manufacturing Company that puts the coal into the mine cars.

The rooms are mined by Goodman duckbill loaders with shaking convey-

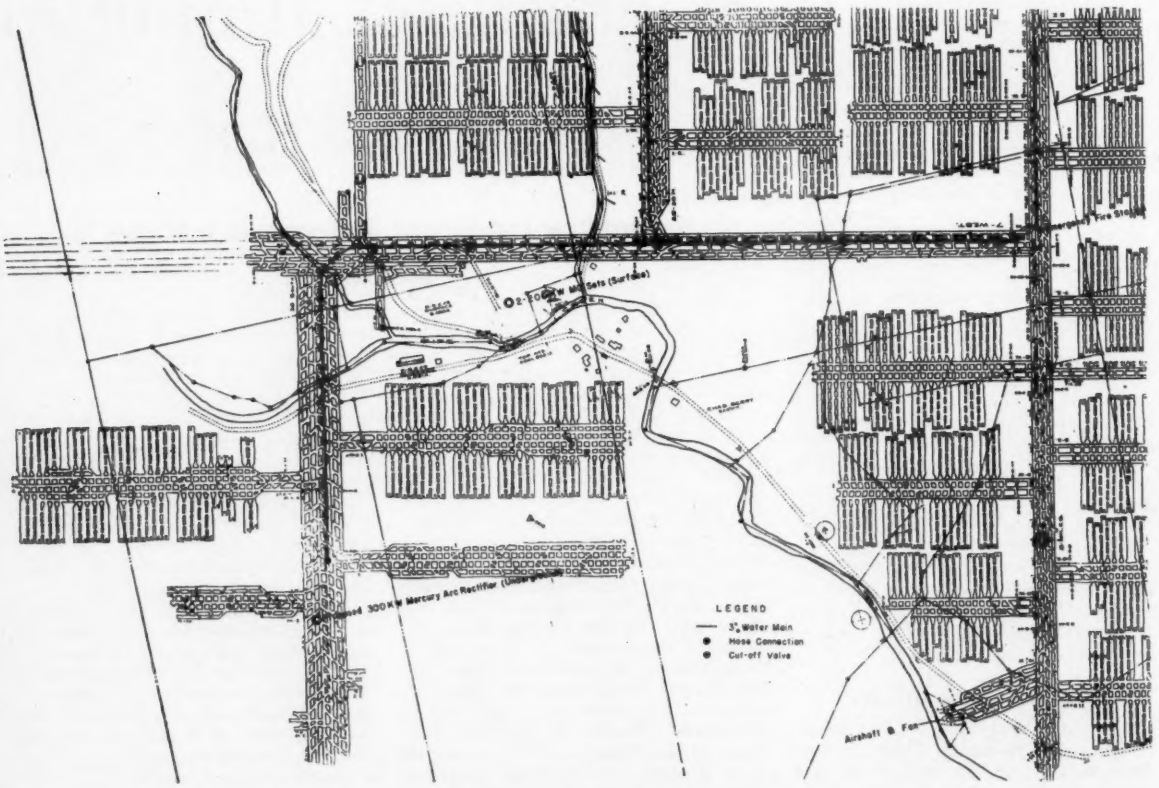


Fig. 1. Mine map showing working panels

Water is sprayed to allay dust on underground machines

Left—On mechanical loader

Center—On cutter bar

Bottom—Elevator from shuttle to mine car

ors and each operating unit consists of ten rooms—five off each side of the entry. The room conveyors transport to the entry and there load onto a 30 in. Goodman belt conveyor laid in the center entry and extending from the workings, 1,500 ft. to the intersection with the main haulage on the Face Entry. This belt operates at a speed of 240 ft. per minute and its capacity will take care of the panel output. However, it should be explained that the rooms are mined by "rotating crews"; that is each pair of rooms has a crew of five men whose work is so divided that the preparation is being done in one room while the loading is in the other. In this way only five rooms out of the complete battery of ten are loading onto the belt at any one time.

At the belt discharge, the mine cars are loaded in a trip which is moved by a Brown-Fayro trip mover. This consists of a small "barney" which is set between the rails, electrically operated and engages an angle iron on the bottom of the mine car. The "barney" has a forward and back movement of about two car length, and engages each car in the trip successively, moving the entire trip which remains coupled together. The face entry is double tracked and 40 cars are placed at one time for loading.

Haulage

As previously described, the coal is transported by belt from the rooms to the face entry where track haulage is installed. The main haulway is five miles in length from the tipple to No. 29 North Heading, which may be considered as the entrance to the live workings. This track is laid with some 60 and some 80 pound rail and about four miles of it now has welded joints. These are made by the bronze welding process, and have given

highly satisfactory service both for haulage and for power return. At each joint a piece of rail is cross welded across and under the track to the rail on the opposite side; the cross rail is placed upside down so that its flange is welded to the bottom flange of the track rail. This serves to keep the rails to exact gage and as the joints are staggered, each rail is therefore held at its center and at each end.

The seam has only a slight grade—averaging slightly over 1 per cent and there have been no major problems in the track construction or maintenance. The haulage is with 18 ton Baldwin Westinghouse locomotives which handle 50 car trips. Present mine cars are of 2½ ton capacity, but a new 4-ton type of steel construction is in design.

Dust Abatement and Fire Protection

To prevent formation of coal dust underground, a very extensive and complete system of water sprinkling is employed, pumping from the Ohio river to the working places through a piping system that is more than five miles long. The water is first raised from the river to a tank near the tipple and from there is taken into the mine through a 3 in. pipe line. The elevation head at the tipple will fill the pipe half way to the workings by gravity, but at no pressure, so a series of centrifugal pumps are placed in the line at about 1½ mile intervals and operate continuously to maintain a pressure at the working faces, adequate for sprinkling and spraying. The 3 in. line extends through to the mouth of No. 29 North Entry and from there the water is taken up the room entries by 1¼ in. pipes. At the mouth of each room there is a hose connection with ½ in. rubber hose leading to the face.

Sprinkling is used on all machines. The shortwalls have one spray that applies water on the ingoing bits; the Sullivan Universal cutter has two sprays, one on the ingoing and one on the outgoing bits. Each loading machine also has a spray at the loading head that directs water onto the coal as it is loaded. In addition, there are sprays at the elevator discharge onto the mine car and also at the belt discharge to the trip of mine cars (See figs. .. and ..). As result of this sprinkling, there is practically no dust in the mine air but as an added precaution all entries and rooms are rock dusted.

Fire protection is a second major purpose of the underground water system. There are several emergency fire stations at strategic points in the mine, each having several hundred feet of hose mounted on a mine truck. Along the main and face headings at close intervals, there are fire plugs placed in the 3 in. pipe line; a few of these are shown on the map in Fig. 1.

As a further safety measure all underground employes are required to wear hard hats, hard shoes and tight clothing and in addition each man is furnished with a self rescuer. First aid and mine rescue instruction is given and once a month a safety meeting is held by each section underground which is attended by everyone on the section,—approximately thirty men. This is done at the beginning of the shift and includes a talk of about 15 minutes.

Ventilation

As will be seen on Fig. 1 the face entries are driven in sets of six; the two outside pair are used as intakes and returns but the two center entries, which contain the haulage road (that is double tracked in the face entries) are on neutral ventilation. That is to say, these two entries are not part of the mine circuit and are ventilated only by trip movements. This is a feature designed to provide an exit from the mine that will be free of smoke in case of an underground fire.

The fan, located on the surface is an 8 ft. aerodyne furnished by the Jeffrey Manufacturing Company. This is electric driven but has as a standby, in case the electric power should fail for any reason, a marine type gasoline engine that can be belt connected to drive the fan in a very few minutes.

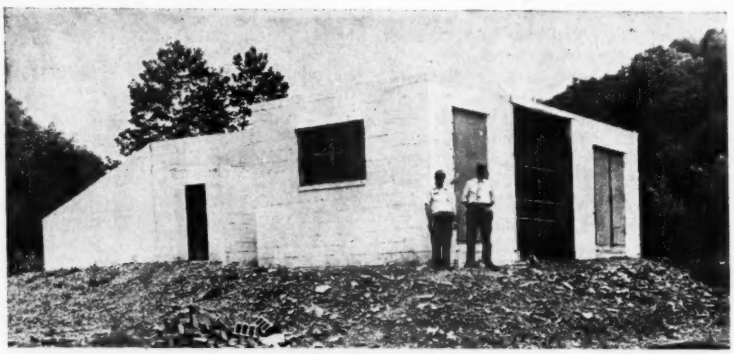
Coal Preparation

The middle parting and top binder are separated from the coal during the loading at the face but further cleaning is done by hand picking at the tipple. These impurities which are removed underground are loaded as refuse; formerly this product was sent to the slate dump but recognizing that a considerable amount of fuel value was being wasted by this procedure a recovery plant was completed in August, 1945, to reclaim this coal.

The material is now brought to the tipple from the mine in the regular car trips and dumped over the rotary dump; the refuse, however, is diverted by a hinged plate to a bin from which the cleaning plant is fed. Between the rotary and this bin there is a set of bar screens to take out the plus 5 in. material which goes directly to the slate dump.

At the bottom of the refuse bin a reciprocating feeder puts the material onto an elevator which discharges into a crusher that reduces everything to a 2 in. minus size. This product then goes through a Jeffrey diaphragm jig and the cleaned coal passes over dewatering screens where it is further cleaned by sprays and thence is mixed with the regular mined product in the railroad cars. The refuse is hauled by a special dump truck to the outside slate disposal, where the material is leveled by a bulldozer to prevent a gob fire.

An average of 1,000 tons of refuse per day is brought from the mine and from this is made a recovery of 212 tons of coal per day. In view of the fact that this tonnage was formerly wasted, the installation and operation of this cleaning plant has of course been highly profitable.



A modern fan installation

Surface Plant

The tipple and cleaning plant are located along the banks of the Ohio river but the "service center" of the operation is back from the river, about three miles from the tipple. Here is a modern surface plant—a machine shop fully equipped to do all usual repair and maintenance jobs, a supply house, oil storage, a bath house and lamp room. All buildings are new—constructed of concrete tile and painted with white waterproofing. They make a very attractive appearance. At this center is an entrance to the mine for men and supplies, a slope about 100 ft. deep with track and rope hoist for material and concrete stairs for the manway.

Developments in Underground Drilling and Blasting Practice

The Use of Diamond Drill Blast Hole Drilling and the Shaped Charge May Influence Profoundly Future Metal Mining Methods

By W. T. WARREN

General Superintendent
National Tunnel & Mines Co.
Tooele, Utah

THERE has been a great deal written about new developments in underground drilling and blasting practice during and since the last war —and by those thoroughly qualified to do so. Following such men of wide repute as Mr. Borcherdt, Professor Bucky, John Curzon and John Huttl is a rough assignment—especially where I am comparatively inexperienced, untraveled and strictly an amateur.

My paper deals solely with developments at the National Tunnel & Mines Co. property near Tooele, Utah, during the period from December 1, 1941, to date. The "Tunnel" is a subsidiary of the International Smelting & Refining Co. and during the war period produced around 700 tons daily, mainly copper ore with some lead and zinc. At the present writing, production is quite low as we are operating on a development setup.

Operations at the Tunnel, to make a short story shorter, demanded that we pull rabbits out of the hat in great numbers. Diamond drill blast hole methods did the job for us and shaped charges came along at the finale to make our work easier. In the short time allotted me all I can attempt to do will be to hit the high spots and describe some of the more unusual aspects of our work that show how easy and flexible diamond drill methods can be. From the descriptions, some of you gentlemen may recognize an application to some particular problem of your own—I hope so at any rate.

It seems as though the general consensus of opinion is that diamond drilling is confined to ore bodies with strong, hard walls in steeply dipping veins of good width and that the only moot question in long-hole work is whether diamond drilling shall be done from vertical raises in a horizontal direction or from drifts in a vertical direction.

Flexibility of Blast Hole Methods Important

Both of these opinions come from man's inherent hesitancy to dive into something new with his whole heart and soul. At the Tunnel we are all champion divers, for it was a question of going "whole-hog" or back to the farm. To illustrate my point I'm going to run quickly through a number of stopes that we have recently mined to completion. I'll show how we have mined steep veins and flat veins, wide veins and narrow veins, veins with good walls and bad walls; where we have used flat holes and vertical holes, and flat-vertical combinations; how we have run upside down raises, cut stope slots for pillar mining, made undercuts and adapted old workings to our new brand of attack.

The following six cuts illustrate pictorially, the flexibility of diamond drill blast hole operations at the National Tunnel & Mines Co. No attempt will be made to delve into minute details as the full history of each stope would mean a lengthy paper.

Figure one shows how a combination of flat vertical holes—plus bench rows were used to pull us out of a jam when a rush job or a shrinkage stope went sour. The shaded area indicates old workings and the balance our initial work before diamond drilling. The shrink became too dangerous because of the width of the ore on the east end and extremely slabby ground. Area (1) was removed as indicated. Area (2) averaged 40 ft. wide although the old workings only indicated a 15-ft. width. We made a bench cut to the hanging wall (N)

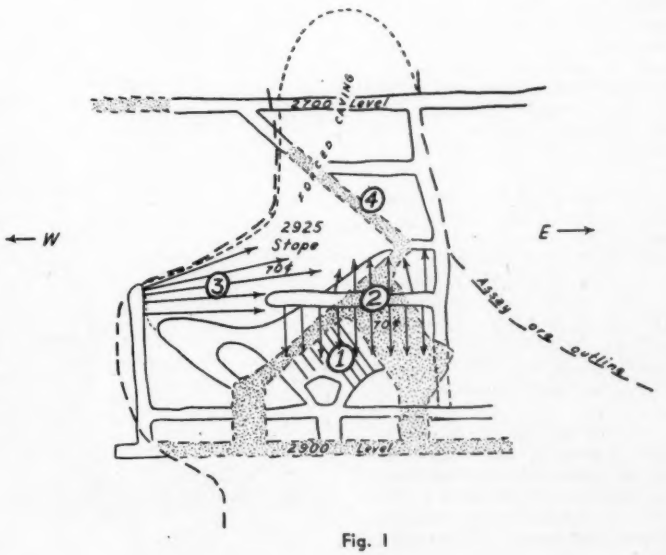


Fig. 1

and drilled up and down slab holes as shown, breaking to the old shrink. Area (3) averaged only about 12 ft. in width, and was started as shown. After (3) was blasted, the remaining ground started caving and was recovered without further blasting. Our cost was 70 cents per ton broken. Our average blast was 2,500 tons, with 2.10 tons per foot of hole and 4.00 tons per pound of powder.

Figure two shows how we adapted preparation work from old workings, to the diamond drills. Again the shaded area indicates the old workings and the balance our initial work before diamond drilling. In this case the "moot" question was solved by arbitration as it were—50 per cent vertical rows and 50 per cent horizontal from a "45 degree drift-raise."

Area (1) was squared up as a result of another shrink attempt—which failed partially because of bad ground but mainly because of ore packing (medium-hard garnet ore). Area (2) is self explanatory. Area (3) was removed as shown because the ore was only about 6 ft. wide (against 30 ft.) and couldn't be removed from the inclined raise without breaking waste.

Results were entirely satisfactory, and the cost 48 cents per ton broken. Our average blast was 2,770 tons, for 3.20 tons per foot of hole and 5.87 tons per pound of powder.

Figure three illustrates the use of the diamond drill in a steeply dipping *narrow* vein (8°) where the footwall was dangerous. The same shading symbol is used.

This stope was a high grade hanging wall stope right up against a large, unfilled footwall stope. In places the intervening pillar was only 15 ft. through. We started a shrink but when we reached the point shown by the red area, the old footwall stope started caving and working in the stope itself became untenable.

We decided to wind up the stope with the diamond drills—working safely from sub-levels. Vertical rings were used as indicated and results were 100 per cent. Cost was $1.10 per ton. Our average blast was for 6.00 tons, with 2.16 tons per foot of hole, and 2.96 tons per pound of powder.

Figure four shows our top diamond drill stope—prepared and mined in a hurry during the worst of the war period, and with very few men. In this stope we really put the diamond drills to work as we had practically no experienced miners. We cut slots, drove a 90-ft. "upside-down" raise, undercut and stoped *all* with the diamond drills. Stope walls were quite bad.

The total cost of the *main stope area* including slotting and undercutting was 40 cents per ton broken (40-ft. vein width), 47,000 tons were broken for 3.00 tons per foot of hole and 8.32 tons per pound of powder. With the main stope area acting as one big undercut, the pillar area (shown in yellow) was mined for 11 cents per ton broken. 56,000 tons were mined for 12.80 tons per foot of hole and 28.91 tons per pound of powder.

Bad walls were controlled by holding an accurate broken ore reserve in the stope to act as filling, and by leaving a 10-ft. pad of ore on the walls. We made an 80 per cent recovery here, where the ground was too solid for block caving, and any other type of mining would have been prohibitive because of the low grade of the ore, and high cost.

Figure five is shown to illustrate how we saved the "tail-end" of a large low-grade block by diamond drilling —that we would have otherwise been forced to leave.

The large stope on the left started caving as we were vertical ring drilling and retreating back along the J No. 1 sub. We decided to leave a substantial pillar (shown) and go to horizontal drilling from the east end-line raise. This step, or method, we call a (pillar cut-out). Area (2)

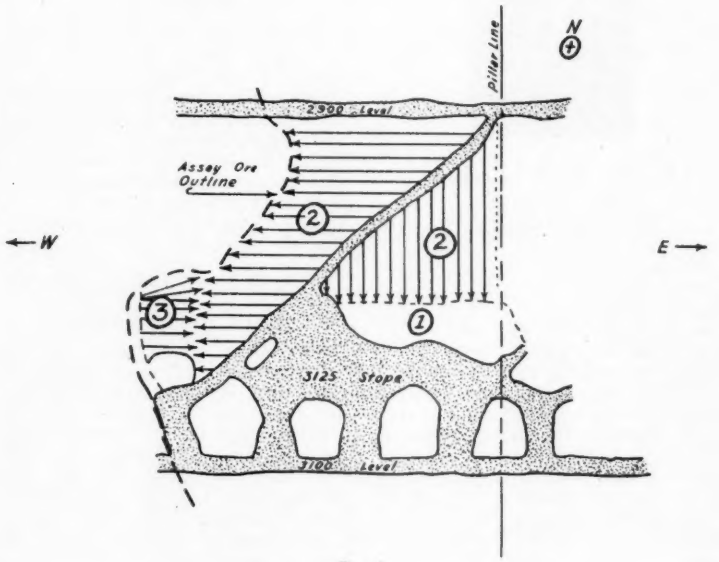


Fig. 2

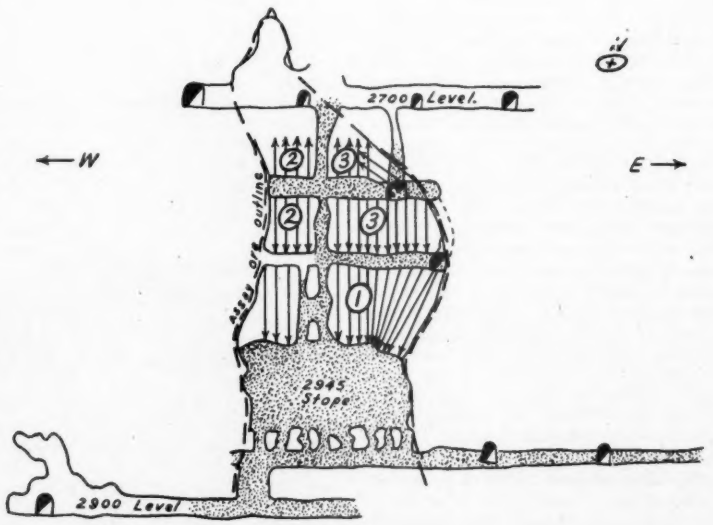


Fig. 3

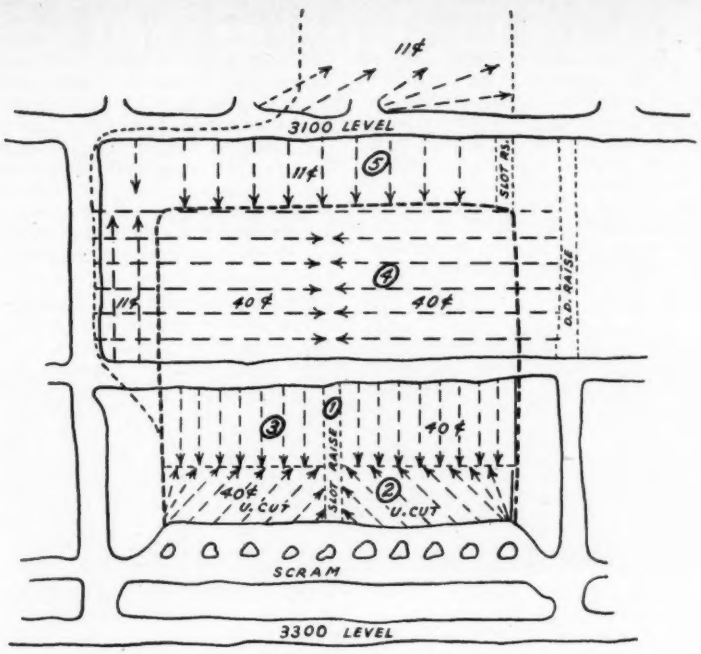


Fig. 4

was undercut as shown for 60 cents per ton broken and areas (3), (4) and (5) removed for 26 cents per ton broken.

Results were excellent and we removed 16,000 tons for an over-all breaking cost of 43 cents; we averaged 3.30 tons per foot of hole and 8.07 tons per pound of powder.

Figure six is perhaps shown to recall memories of a grand old place, the Walker Mine—where the writer had his first chance. The sketch is simple and self explanatory, and shows how nicely a wide, *flat* vein in real hard rock can be simply mined with diamond drills. This was one of our last jobs before the mine closed down and the results were excellent. I have no record of the cost, but it was far cheaper than our standard method.

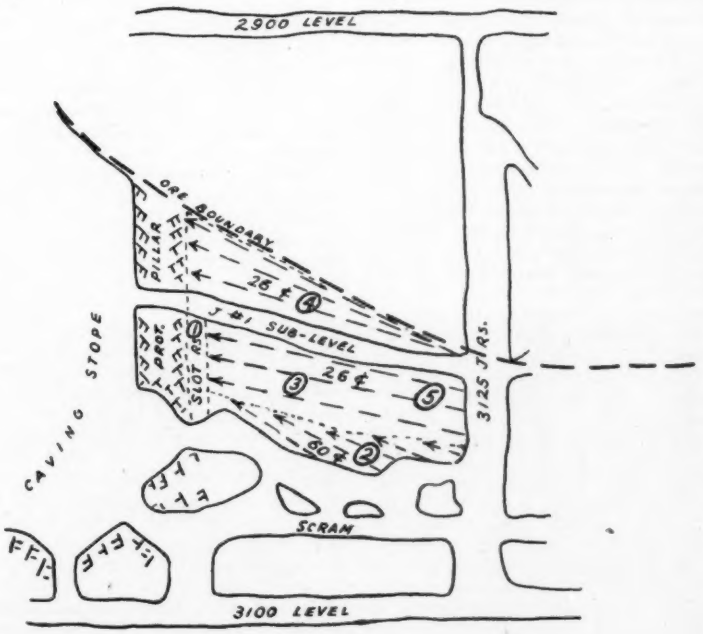


Fig. 5

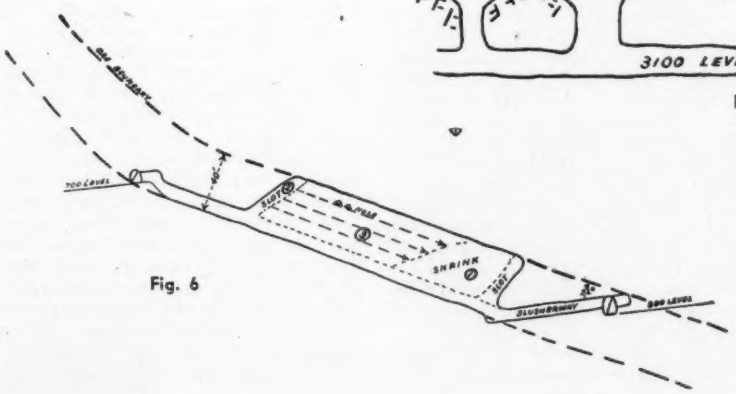


Fig. 6

In passing, I would like to add a few notes from our little black book on diamond drilling that may be of interest and aside from general theories.

(1) In diamond drilling we play for the *end-point*. We like to open the stope up as quickly as possible even though we have ore on the walls and against the pillars. This attack gives us a big hole right now, at a fair cost, and opens up considerable country and loosens up the bulk of the ore. We then drill skimmers down the walls and along the pillars *if necessary* and drill out all of the sheet and level pillars and blast. Where we can do this, our final blasts can stand two to three times the ground on the holes and the burden on the rows—and our end-point cost is very low. With this in mind we leave large sheet and raise pillars during the mining of the "core."

(2) "Wander" in long holes needs close checking. More good blasts are spoiled through careless hole alignment than from any other reason, in my opinion.

(3) If the cost per foot drilled can be lowered—and it should be as time goes on—we favor AX holes for blast drilling. We can increase the ground on the holes and burden on the rows—and when in a tight spot can literally "burn out the ground."

(4) I personally favor breaking the maximum tons per foot of hole possible without regard to the size of the broken ore. Secondary production methods are improving by leaps and bounds and costs can be very low.

Experiments in Use of Shaped Charge Resulted from a Military Application

I have been asked to touch on the work we have done to date with shaped charge blasting—a difficult task for limited time. A problem to most mines that break good tonnages in open stopes is that of secondary breakage—and our mine is no exception. Most of us are willing to try anything that might increase our tons per man shift.

We came across an article awhile back in the *Explosives* magazine, by Mr. Volta Torrey, describing the principle of the Monroe effect as applied to shaped charges during the war. We reasoned that if one shaped charge could blow a 6-in. hole through 8 ft. of re-enforced concrete that somehow such a charge could be made to break up boulders. Right or wrong, the following logic was used. We assumed that cone shaped charges were used by our boys, in order to blast a hole through pill boxes, etc., to eliminate the occupants. We also learned that most German charges were hemispherical and that they were used to break down and crush fortifications instead of punching a hole through them—which charge seemed to be about what we wanted.

We reasoned that a cone shape produced a fine explosive jet of terrific intensity. (The explosive force of powder is exerted at right angles to the faces)—and that the hemisphere produced an expanding jet of various diameters from infinity up, depending on the stand-off distance. With this in mind we made up two sizes of shaped charges to try out and I have the models with me for your observation. Experiments were so successful that the charges were immediately put into practical use and as far as we were able to put the "bombs" into use (production of the cans was slow) we increased our tons per man shift over 30 per cent and consequently effected a material cost saving. We figure that with these bombs we break four tons per pound of powder, or that the powder cost per ton broken is less than 4 cents.

The small charge holds 1¼ sticks and the large one, nine sticks. We use the small size for reduction of boulders on the grizzlies and in the scrams, and the large size mainly for breaking up finger hang-ups. With the small sizes we can place at least 10 charges while drilling one blockhole and loading and shooting. With the large bombs on finger hang-ups one charge has many times done the work of three boxes of powder and in a few moments as against several days.

I sincerely hope that there are some among you who have seen our results in order to substantiate my statements. The results have never failed us, and never cease to amaze me. Unfortunately we are now on a development program and are doing no stoping so I cannot invite you out to see our bombs in action. During our limited time of proving, we did manage to show our work to a good many A. C. M. officials and representatives of the powder companies—and the latter are now at work improving our crude bombs for general use.

We hope with all our hearts that this "gadget" may be of real help to mining in general—and we do know that if you all will help, and especially the powder companies, that a great deal of good will come of it.

* * *

E. R. Borcherdt, research engineer, Anaconda Copper Mining Company, in discussing Mr. Warren's paper at the Denver meeting of the American Mining Congress, indicated that the success of blast hole drilling often depended upon the shape and pitch of the ore bodies. Strong walls, uniform grade of ore, and good breakage influence proper blast drill hole spacing. Another advantageous factor is safety and in some cases reduction of development work is possible using blast hole drilling. Mr. Borcherdt thought that Mr. Warren was somewhat optimistic in connection with ore breakage but pointed out that blast hole methods should be considered when laying out work for a new mine.

Mr. Borcherdt indicated that the use of the shaped charge was of course still in the experimental stage. So far, experience has been limited to conditions at the National Tunnel and Mine operation. However, the results have been very remarkable in many respects and Mr. Borcherdt looks to further development in the use of the shaped charge.

Mining Association of Montana Meets

SEVERAL hundred mining men assembled in Missoula, August 30 and 31, to hear industry leaders and representatives of Government speak on such important subjects as Federal legislation affecting mining, industrial accident insurance problems, functions of the United States Bureau of Mines, activities of the Montana State Bureau of Mines and Geology, geologic mapping, and future development of ore reserves.

At the opening session, Julian D. Conover, Secretary of the American Mining Congress, discussed "Federal Legislation Affecting Mining." He highlighted various measures which came before the 79th Congress, including OPA extension, the Premium Price Plan, taxation, Social Security rates, labor legislation, silver price, gold mine relief, tariffs and trade agreements, Securities and Exchange regulations, and public lands. He stated that the Congress had done a real service by turning down many harmful measures proposed by the advocates of a planned economy. He pointed out that the "have-not" philosophy prevalent in certain quarters is a major hazard in the development of national mineral policies which will encourage development of our mining industry, saying that "the real answer is not to discourage mining here in favor of imports but to restore the incentives and take off some of the shackles that are holding back enterprise—to make it worthwhile for miners to take long chances again, and to build up our own domestic industry as a 'going' institution which can supply the minerals we need in ordinary times and can be prepared with the facilities and the 'know-how' to serve the country in time of war."

A spirited discussion of industrial accidents and workmen's compensation rates was held following presentations by W. R. Calloway, manager of the Victoria Mines and J. Burke Clements, chairman of the Montana Industrial Accident Board.

At a special evening session, Dr. R. R. Sayers, director of the U. S. Bureau of Mines, outlined the far-flung activities of his agency in serving all branches of the mining industry.

With Dr. Francis A. Thomson, president of the Montana School of Mines presiding, a full session was given over to discussions of the program of the Montana Bureau of Mines and Geology, designed to aid in building up and expanding Montana's mineral production. Progress on the geological map of Montana was reported by Clyde P. Ross of the U. S. Geological Survey.

At a special luncheon session under the auspices of the Mining Association of Montana and the Montana Coeur d'Alene and Columbia Sections of the A.I.M.E., Stanly A. Easton, president of the Bunker Hill and Sullivan Mining and Concentrating Company, spoke on "Metals for Tomorrow." Mr. Easton reviewed the misconceptions which have arisen concerning the state of our mineral reserves; he then referred to our experience in recent years in reviving old mines thought to be worked out and in making new discoveries — citing the quicksilver industry with its remarkable expansion during the war; the deep area of the "silver belt" in the Coeur d'Alene; the tungsten-antimony-gold ores of Yellow Pine, Idaho, and the great porphyry copper ore body of San Manuel, Arizona. Emphasizing the greater expenditure of capital and technical knowledge required in modern prospecting, he urged the necessity for better Gov-

(*Continued on page* 74)

Metal Mining Convention and Exposition Prove Huge Successes

Large Attendance, Key Addresses by Prominent Men, and Imposing Displays of Equipment Feature Denver Meeting

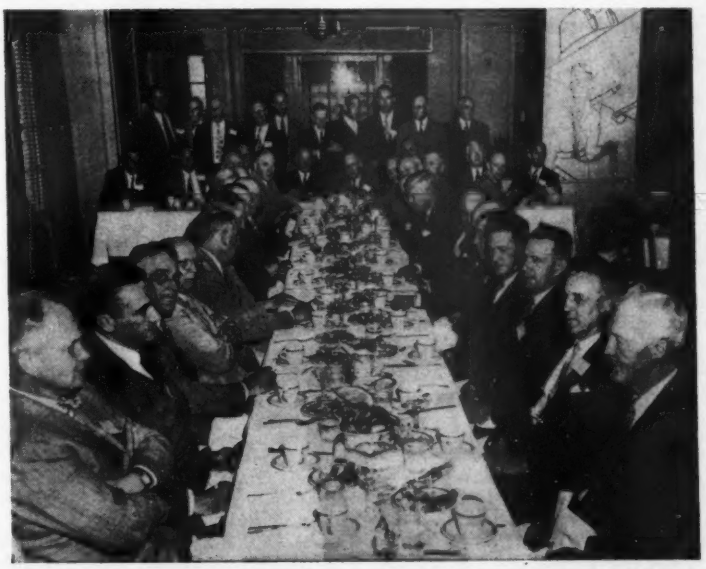
Both Operating and General Sessions were well attended as mining men displayed keen interest in all discusssions

OVER 2,300 metal mining men met within the shadows of the majestic Rockies at the first postwar convention and exposition of the Western Division of the American Mining Congress, held at Denver, September 9-12. Outstanding discussions of serious industry problems, such as the development of future ore reserves, stockpiling of metals, labor legislation, subsidies, tariff, taxation, public land policies, economic and market conditions, rehabilitation of gold mining, developments in underground and open-pit mining, and improvements in milling practice were presented by key industry leaders and high Government officials, in a sparkling program arranged under the able direction of J. B. Haffner, general manager of the Bunker Hill and Sullivan Mining and Concentrating Company, and his fine program committee.

Latest Developments Feature Machinery Displays

Rivaling the convention sessions in interest were the displays of over 80 leading manufacturers featuring the latest developments in mining and milling machinery and equipment. Large numbers of representatives of the technical staffs of the manufacturing companies were on hand to give mine operators and their key officials first-hand information on the equipment displayed and to discuss their operating problems. The exposition, occupying the entire floor space of the two large halls in the city auditorium, was thronged during the full four days, and two afternoons were left open for uninterrupted inspection of the exhibits.

Despite the requirements of war and the difficulties of reconversion that have been facing industry, the manufacturers of mining machinery have been able not only to improve existing equipment but to place new products on the market. One could not fail to be impressed with the ingenuity of the designing engineers who, in the face of manpower and material shortages, have achieved the results so in evidence at the Denver auditorium. New types of locomotives, drilling equipment, conveyors, drill carriages, mucking machines, electrical and safety devices, pipe couplings, ultra-violet lamps for prospecting, crushers, rod mills, steel cable, lubrication equipment—all were displayed and in many cases demonstrated by the men who were responsible for building the machinery. Some of this equipment was being shown to the mining industry for the first time.



Board of Governors, Western Division, American Mining Congress meets to discuss policies for the coming year

Association Secretaries Interchange Views

Prior to the formal opening of the convention and exposition, on Sunday, September 8, secretaries of the various western metal mining associations met to discuss mutual problems. With Robert S. Palmer, secretary of the Colorado Mining Association, presiding, state mining secretaries thoroughly aired common questions dealing with compensation insurance, aids required for the prospector and small mine operator, extension of Reconstruction Finance Corporation activities to assist mining enterprise, relaxation of Securities and Exchange Commission regulations to permit public financing of mining ventures, and the development of further activity in public relations for the mining industry.

"Rid Mining of Shackles," Keynote of Meeting

The convention was formally opened on Monday morning, September 9, when Secretary Julian D. Conover, of the American Mining Congress, reviewed the accomplishments of the mining industry in meeting the demands of war despite shortages of manpower and materials. He sounded a keynote for the meeting when he declared that "we have got to get rid of some of the shackles on mining enterprise and again make it worth while for capital to take long chances in the hope of large rewards—rewards that will not be taken away by excessive and unfair taxes, 'have-not' tariff policies, price controls, one-sided labor legislation, or nationalization of our mines, either directly or through the back door as has taken place in the coal industry . . . trying to develop the mining industry without the possibility of making a spectacular success is like having a lottery without any prizes. The discovery of a new ore body under a policy of encouragement to mining is of far greater value to the public than a little additional taxes. There are a lot of road blocks ahead and it will take the combined efforts of the whole mining industry to remove them. We trust that this meeting will make some real progress on the job."

With R. M. Hardy, president of the Sunshine Mining Co., presiding, delegates at this session heard James Douglas, of the Phelps Dodge Corporation, outline the "World Economic Problems of Copper, Lead, and Zinc." Donald McLaughlin, president of the Homestake Mining Co., spoke on the "Future of Gold." Senator Abe Murdock, of Utah, spelled out the "Future of Silver," and Henry B. Fernald, chairman of the Mining Congress' Tax Committee, highlighted "Problems of Federal Mine Taxation."

Senator Murdock pointed out that in making loans to other countries we should never forget how much the United States has lost in natural resources due to the war. He quoted figures for wartime production in copper, lead, zinc, mercury, and tungsten and stated that in 1945 alone the value of our mineral production was eight billion dollars, even though the demand for metals had begun to slacken. This production, according to Senator Murdock, was the price the mining industry paid for victory. In discussing silver, Senator Murdock reviewed his stand at the hearings on the silver bill and stated that the time had come to convince the public that the people who mine the metal are not racketeers because they advocate a sound monetary system with due recognition of silver. The Senator added that the great majority of people throughout the world acknowledge the metallic standard and the value of both gold and silver. He said the future of metal depended upon four things: (1) The recognition by Congress of the fundamental need for its use; (2) the continued and preferably increased use of silver for industrial purposes; (3) world recog-

—Session Chairmen—

R. M. Hardy
Sunshine Mining Co.

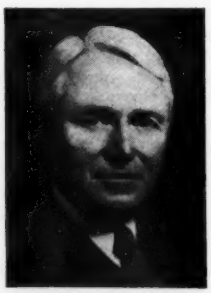
Robert M. Searls
Attorney-at-Law
San Francisco

Howard I. Young
American Zinc, Lead & Smelting Co.

Gloyd M. Wiles
MacIntyre Development
National Lead Co.

E. S. McGlone
Anaconda Copper Mining Co.

John J. Curzon
Chelan Division
Howe Sound Co.



D. H. McLaughlin
Homestake Mining Co.

C. J. Abrams
Climax Molybdenum Co.

J. B. Haffner
Bunker Hill & Sullivan Mng. & Conc. Co.

nition of the indispensability of silver in currency systems; (4) the establishment and maintenance of a stable world price of at least $1.29 an ounce. Senator Murdock then discussed the industrial demand for silver and closed with a review of the economic status of the metal, saying, "Economic peace can never be achieved unless the countries of the world set up sound currency systems based on silver and gold."

The addresses of the other speakers at this session as well as those at all other sessions of the convention will be found in abstract form beginning at page 58.

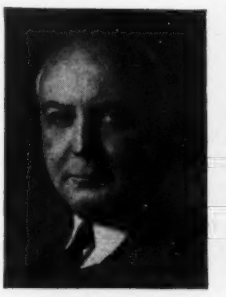
Atomic Energy Control

Following the opening session, delegates attended a welcoming luncheon at which Merrill E. Shoup, president of the Golden Cycle Corporation, and chairman of the Western Division of the American Mining Congress, presided. Mining men were extended a welcome to Colorado by Mayor Ben F. Stapleton, of Denver, and Governor John C. Vivian. The industry's appreciation of this welcome was expressed by Howard I. Young, president of the American Mining Congress; J. B. Haffner; and R. H. Pearson, chairman of the Congress' Manufacturers Division.

The luncheon was highlighted by an address by U. S. Senator Edwin C. Johnson, of Colorado, ranking member of the Senate Military Affairs Committee. From his experience on the Special Senate Committee on the Control of Atomic Energy, he was able to present to his audience many new facts on the subject of atomic energy and its control. Senator Johnson told first how the Atomic Energy Committee found it necessary to "go to school" at the U. S. Bureau of Standards. Before its members, which included his colleague, Senator Millikin, were in a position to evaluate the problem they had to learn the fundamental principles involved. Senator Johnson then reviewed the steps that were taken, both here and abroad, that resulted in the development of the chain reaction and later the bomb used over Japan. He emphasized the destructiveness of this weapon and told his audience that new developments since the end of the war had resulted in the evolution of a bomb a thousand times more effective than the one dropped over Hiroshima. Senator Johnson pointed out that scientists who worked on the project were convinced that in the event of another war this bomb would undoubtedly be used, and ended by indicating that although we are willing to set up controls under the United Nations, as yet other nations have not been impressed sufficiently to agree to the steps we know are necessary if a world catastrophe is to be avoided.

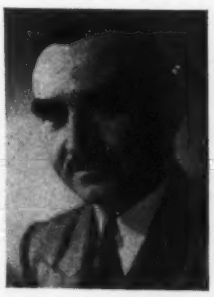
Other distinguished guests who attended this luncheon were Senator Abe Murdock, of Utah; Congressman Dean M. Gillespie and Congressman Robert F. Rockwell, both from Colorado; Democratic candidate for Governor, Lee Knous; and Leon Lavington, chairman of the Colorado Republican Committee, the Republican nominee for Governor.

The scheduled Monday afternoon session on Federal labor legislation had to be postponed until Tuesday afternoon when it became known that Senators Joseph H. Ball, of Minnesota, and Wayne Morse, of Oregon, were unable to get to Denver due to bad weather conditions which made traveling by air impossible. Postponement of this session made it possible for delegates to devote further time to studying the exhibits of mining equipment.



Abe Murdock

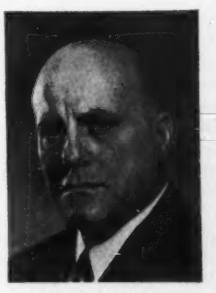
Edwin C. Johnson



Wayne Morse

Jos. C. O'Mahoney

Leading Western Senators Pointed Up Mining's Problems



Eugene D. Millikin

Tuesday's sessions embraced discussions by Government authorities on the Premium Price Plan, trade agreements, and stockpiling, followed by a symposium presenting viewpoints of industry leaders on these subjects. Another morning session was devoted to mine operating problems, stressing mechanization for greater production efficiency.

Labor Legislation Discussed

The labor session as held Tuesday afternoon proved unique due to the absence of the two Senators who had been scheduled to address the delegates. Bad flying conditions still prevented Senator Ball from reaching Denver but his colleague, Senator Wayne Morse, had reached Denver Monday evening, where he obligingly recorded his scheduled speech before departing early Tuesday morning to keep an important previous engagement. Delegates listened with interest to the lifelike and forceful presentation of his address. Senator Morse sharply criticized the Truman administration for attempted passage of what he termed "strait-jacket" labor legislation. He stated that the Federal Government should stay out of labor disputes involving wages, hours, and working conditions. He called the President's anti-strike bill an attempt to put a gun in the back of labor. He said that he hoped the next Congress will replace the Labor Department's Conciliation Service with a private conciliation, arbitration, and mediation board, in which both the employer and labor would have confidence. Morse emphasized that the right to strike is relative and not absolute and warned labor that misuse of the strike privilege would lower its prestige in the eyes of the people. He said that thus far only employer practices have come under scrutiny and it is time that labor, too, be checked before any more legislation is passed. He pointed out that the Wagner Act was unfair to employers because it gave them no chance to take matters up before the board. Following the Senator's address, a spirited discussion of "What

Is Needed in a Sound Code of Labor Law" was participated in by mining men having long experience in labor matters, from California, Montana, Idaho, Arizona, West Virginia, and Colorado.

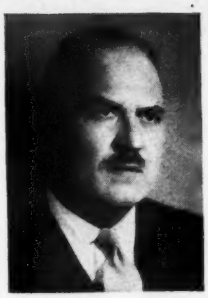
Government Policies and the Minerals Industry

Sessions on Wednesday were devoted both to labor and manpower problems and to advances in mining practice. High point of the day's activities was a special luncheon meeting at which Secretary of the Interior J. A. Krug set forth Government policies and their relation to the minerals industry. Presiding at the luncheon was Horace M. Albright, vice president of the U. S. Potash Co. Secretary Krug was introduced by U. S. Senator from Wyoming Joseph C. O'Mahoney, who dwelt on the effectiveness of the cooperation between Government and industry during the war, and the application of these democratic principles being made by the new Secretary of the Interior in administering his important office.

Mr. Krug opened his address with a brief comparison of the German and Japanese production systems with our own during the war years. He pointed out the advantages that the totalitarian States possessed and how this was overcome by our wartime efforts. He then discussed the seriousness of the mineral reserve situation and stated that present trends indicate a greater demand for metals in peacetime than has ever been the case in our history. He said that our rate of discovery had not kept pace with increased metal requirements. Mr. Krug pointed out the importance of replenishing our mineral reserves and emphasized the aid the Government must have from industry to help solve this problem.

The Secretary ended his address with a plea that the mining industry join the Government in drawing up a plan of action to assure a strong American mining industry and an adequate supply of mineral resources for our future needs. Mr. Krug then suggested that the American Mining Congress appoint a special committee to aid his department in this work and to discuss with him ways and means of solving the problems that lie ahead. His suggestion met with wholehearted endorsement of the convention, which adopted a resolution calling for the appointment of such a committee.

The afternoon was left open for a visit to the exposition and Mr. Krug, accompanied by Mrs. Krug and his small son, visited many of the displays and discussed developments in mining equipment with many of the manufacturers.



Merrill E. Shoup

Horace M. Albright

D. P. Strickler

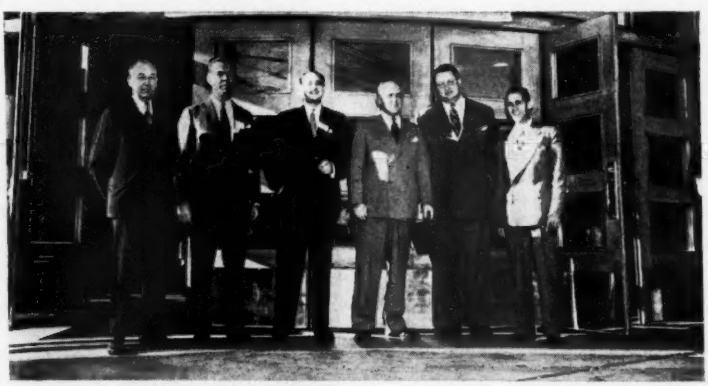
As chairman of the Western Division, Mr. Shoup presided at the Luncheon and Welcome to Delegates, Monday noon. Mr. Albright officiated at the luncheon on Wednesday honoring the Secretary of the Interior, Mr. J. A. Krug. Mr. Strickler was toastmaster at the banquet, which culminated the convention proceedings

Annual Banquet Winds Up Meeting

The last day's general session opened with a discussion of future ore reserves, and an operating session at which new developments in milling and safety were reviewed. At noon the Board of Governors of the Western Division of the American Mining Congress met at luncheon. Plans were made for the 1947 meeting and possible convention cities were discussed.

The final session of the meeting, following discussions of geophysical prospecting, public land policies, and public relations, closed with the report of the Resolutions Committee. Under the able chairmanship of Donald A. Callahan, president of Callahan Consolidated Mines, Inc., the Resolutions Committee had been working throughout the convention on the Declaration of Policy, which is carried in full in this issue (pages 50 to 54).

The annual banquet was held at the Shirley-Savoy Hotel, Thursday evening. David P. Strickler, president of Stratton Cripple Creek Mining & Development Co., acted as toastmaster. Mr. Strickler's anecdotes, delivered to the assembly in a manner characterized by his dry wit, kept his audience in a gale of laughter. After introducing the various officers of the American Mining Congress who were at the speakers' table, Mr. Strickler presented the Hon. Eugene D. Millikin, Senator from Colorado. The topic of Senator Millikin's talk was that of the Political Implications of Atomic Energy. The Senator made an unusually impassioned plea that the public attempt to understand the seriousness of this amazing development on the world scene.



Manufacturers' Division officials welcome Interior Secretary J. A. Krug for a tour of the extensive mining equipment exhibits. Left to right: H. V. Brown, Brown-Fayro Co.; P. D. McMurrer, American Mining Congress; J. H. Fulford, Jeffrey Manufacturing Co.; A. S. Knoizen, Joy Manufacturing Co.; Secretary Krug; and J. J. Huether, General Electric Co.

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GOODMAN

Senator Millikin in his address took up the subject where Senator Johnson left off. After reviewing the steps the late President Roosevelt had taken which resulted in the development of the bomb, and mentioning its possible peacetime applications, Senator Millikin stated that this weapon was a challenge to all mankind. In a powerful plea to all nations whose leaders are today departing from the paths of peace, he said: "We are dealing with an elemental force that can only be confined by elemental changes in the management of the world. The bomb is not a tennis ball to be batted back and forth in the genteel atmosphere of traditional diplomacy. The bomb is not something which can be disposed of with a chart or a graph or an agenda or by signatures, seals, and sealing wax on diplomatic documents. It cannot be disposed of by ignoring it or by wishing that it did not exist or by hoping that it may never be used. All lazy escapisms are out. This weapon is one that smooth talk, compromise, and slick answers, verbosities, and surface solutions cannot stand against—the bomb-shattering blast, its thousand-mile-an-hour gale, its deluge of death-dealing rays, its three-million degrees of heat."

Senator Millikin then discussed the question of world control of atomic energy and the present barriers that prevent attainment of this ideal. In closing he stated that we had no alternative but that of continuing our attempts to secure cooperation on a world-wide basis; we owe that much to our dead of two world wars.

Old Time Western Entertainment Provided

The convention was not without its lighter side. The Entertainment Committee arranged a series of evening events, which enabled delegates to mingle in the spirit of good fellowship that always characterized these Western gatherings.

On Monday evening a buffalo barbecue was held at Elitch's Gardens and over 800 people were treated to a program of old-time western entertainment.

Knowing of the great interest of those in attendance in professional football, the committee left Tuesday night open in order that delegates and their friends might view the game between the Washington Redskins and the Green Bay Packers. A real evening of thrills was provided as the two teams battled until the closing moments, in a hair-raising contest in which the Redskins finally came through as victors by a 35-31 score.

On Wednesday evening a mountain trout dinner and dance was held at the Broadmoor Club. This evening

The Gardner-Denver Co. exhibit featured mine car loaders, drills and sharpening equipment

Imposing exhibit of Joy Manufacturing Company featured two entirely new products —a midget air winch and an hydraulically operated drill jumbo known as the "hydro-drill-jib"

Perpetual motion approached at SKF exhibit. Company officials had difficulty convincing delegates that magic wasn't used to keep ball bearings continually rolling down a spiral track

The annual banquet rings down the curtain on the industry's first post-war meeting

Typical Western hospitality and good-fellowship prevailed at evening events

proved one of the high spots of the meeting and will be long remembered by convention visitors.

The entire entertainment program was most successful, due to the untiring efforts of Merrill E. Shoup, chairman, and Robert S. Palmer, vice chairman of the General Committee; R. H. Summer, chairman, and E. D. Dickerman, vice chairman of the Entertainment Committee; F. S. McNicholas and Warren Prosser, subchairmen for the buffalo barbecue and dinner-dance, respectively; Oscar H. Johnson, chairman of the Reception Committee, and A. Roy Wicker, chairman of the Transportation Committee. All these men and their coworkers are to be heartily congratulated and thanked for the splendid results of their efforts.

Throughout the meeting special programs were arranged for the ladies, including a trip to the lovely mountain park area west of Denver and to Troutdale-in-the-Pines for luncheon, and a tour of some of the lovely gardens for which Denver is noted. Mrs. A. E. Carlton, of Colorado Springs, was chairman, and Mrs. R. S. Palmer, of Denver, vice chairman of the committee which planned those delightful functions for the visiting ladies.

Brief abstracts are herewith presented of the various convention papers. Only the highlights are given at this time as space limitations prevent the printing of each paper in complete form. Two papers appear in full in this issue and others will be presented in subsequent numbers.

A Declaration of Policy

THE WESTERN DIVISION, AMERICAN MINING CONGRESS

Assembled in Annual Meeting, Denver, Colorado, September 12, 1946, declares its views upon the following matters of public policy:

THE MINING INDUSTRY after a full year of peace is still confronted with many of the difficulties created by war.

Its developed reserves, depleted by all out production for the war effort, still are inadequate because of lack of manpower to meet expanded domestic requirements for metals. Many governmental restrictions required by war still remain. Labor shortages still interfere seriously not only with exploration and development but with actual production. Scarcity of materials and supplies still exists and the ability of the industry to meet industrial requirements for metals is thus greatly handicapped.

We realize the dependence of our nation upon the products of our mines to supply the many civilian needs which had to be deferred during the years of war. We hope for an early return to normal conditions and removal of the handicaps which now prevent our industry from fully satisfying these needs.

During the war the mining industry gave its best and in doing so used up reserves of metals and minerals which would not have been produced for normal consumption over a period of many years. We believe that with faith and courage which are characteristic of this industry the accomplishments of the past will be repeated, and the minerals and metals necessary for the machines and appliances needed in times of peace will be forthcoming.

Certain conditions, however, must be realized if we are to reestablish our industry upon a basis sufficient to supply the metals and minerals needed in peace as well as for national defense.

We must establish a national mineral policy through cooperation of management, labor and government agencies concerned in such a program. To this end we pledge to the Secretary of the Interior the cooperation and effort of the industry which he has requested. We recommend therefore that the directors of the American Mining Congress select a committee representative of all branches of the industry to cooperate with and assist the Secretary of the Interior in working out such a policy.

This program cannot be effectively carried out without:

A lessening of government restrictions no longer necessary.

A settlement of labor difficulties upon a basis of mutual interest.

A tax policy which recognizes the hazards involved in the financing of mining operations and the peculiar character of the operation itself.

A lessening of restrictions upon the investment of risk capital in primary mining ventures.

A better understanding on the part of the people generally, and those who enact and administer our laws particularly, that the economy of our nation, the happiness and welfare of our people, and the safety of the republic itself depend upon a healthy mineral industry.

Given these essentials, the mining industry of this nation pledges itself to full contribution toward the increasing greatness of our nation and the welfare of its people.

LABOR RELATIONS

We restate our belief in true collective bargaining. The people of the United States endured during the past 12 months the most disastrous strike wave in history. Collective bargaining was frequently by-passed by irresponsible labor leadership in favor of strikes, even against the Government. An important industry was nationalized at the will of a single man. Such conditions are the result of the present day labor laws and policies of the Government which not only permit but encourage such strikes.

Unions are encouraged if not compelled by precedent, rivalry and governmental policy to repeat the strike pattern in added intensity.

The time has come when it is necessary, not only for the country but for the unions, that Congress *promptly* enact laws which will restore col-

lective bargaining and which will remove those causes which render the Nation defenseless in the face of strikes.

Such laws should affirm and recognize as lawful the strike by lawful means for legitimate ends. Such a strike is an economic weapon necessary to collective bargaining, but the strike against Government, the strike against other employers not involved in the dispute, and the strike by a combination of unions to tie up an entire industry or industries are economic weapons which are too dangerous in the hands of the few for the continuation of free enterprise and the safety of the nation.

The country should extricate itself from its perilous position resulting from the heavy concentration of economic power in the unions, by forcing their decentralization, requiring bargaining on a plant or bargaining unit basis, prohibiting the industry wide strike, and making unions and their officials and agents subject to the anti-trust laws. Unions should again be made responsible for the acts of their officers and agents and should be sueable as legal entities in the courts.

Mass picketing, violence and intimidation should be made unlawful under the Federal law and violators should be subject to civil, criminal and equity actions in the courts.

The National Labor Relations Act should be revised to recognize and prevent unfair labor practices by unions which cause strikes and industrial strife.

Employers should be as free to talk to their own employees about unionization, bargaining negotiations or strikes as are labor representatives.

The National Labor Relations Board should not be exempt as it now is from the traditional check and balance system, and courts should have the right to determine whether the Board's findings of fact are based on relevant evidence and a preponderance thereof.

The Congress should enact a law which has as its purpose the protection of the rights of employees as individuals, to the end that no one should be required to join or remain a member of a union as a condition of employment.

Employers should be forbidden by law to pay money to unions directly or indirectly, by way of royalties or otherwise, for any purpose unless such money results from authorized payroll deductions.

Congress should definitely declare that supervisory, professional and administrative employees are not covered by the National Labor Relations Act.

Union proposals encroaching on the employer's right to manage the business should be legally excluded as improper subjects of collective bargaining.

Congress should correct the United States Supreme Court's interpretation of work-time under the Fair Labor Standards Act, and restore the definition to that which was intended when the law was passed as pointed out in dissenting opinions of the Court. Working time should be time actually worked. We urge prompt passage of legislation limiting to one year the time for bringing civil suits to collect damages and penalties arising under the Fair Labor Standards Act and other Federal statutes.

It should be unlawful for a union to spend any money on behalf of a candidate, directly or indirectly, in any primary or general election or for any other political activity.

PRICE CONTROL

We favor immediate decontrol of metals and minerals, and the return to a free market.

Pending decontrol, we deem it imperative to the procurement of metals required by the economic demands of our country, that the prices of non-ferrous metals be advanced to and thereafter maintained at parity with world metal markets.

TARIFF

Adequate tariff policies must be maintained to protect the domestic mining industry against competition of richer natural deposits, lower labor costs, exchange regulations, and the operation of cartels in foreign countries.

To the extent that considerations of national defense and the national economy require production in excess of that available under free market conditions and governmental tariff policies, certain mineralized areas, from which substantial production is available, may require and should receive special assistance.

STOCKPILES

We endorse the recently enacted stockpiling legislation and pledge our cooperation to the Army and Navy Munitions Board in the administration of the Act.

PUBLIC LAND POLICY

We hold that the public interest will best be served by maintaining the long established policy of fostering domestic mineral production by free private enterprise on the public domain, thereby promoting exploration that will lead to mineral discovery and thus strengthen the position of this Nation to meet future needs. To this end, we op-

pose any attempt to nationalize the mines of this country, or to extend the government leasing system to cover lands valuable for those metals and minerals which for nearly a century past have been subject to laws authorizing the location and patent of claims.

We likewise oppose expansion of the mineral leasing system by executive order or regulation under which (a) Government seizure or compelled sale for Federal use or distribution of all or part of the production from leased lands over and above royalties in kind would be authorized; or (b) exploration by private enterprise for minerals subject to the leasing system would be prohibited or restricted.

We advocate amendment of statutes governing creation and extension of Indian reservations on the public domain, including Alaska, to require that all Federal mining laws be continued in full force and effect on lands thereafter set aside for such reservations. We advocate immediate review by Congress of reservations established by executive order in the past ten years, followed by legislation reducing their areas to reasonable present and future needs of the Indian populations therein and restoring eliminated territory to exploration for metals and minerals.

We recommend that all military reservations not needed for permanent defense of our country be returned to the public domain and reopened to exploration under the existing mining laws.

We endorse the principle of the bill introduced by Senators McCarran and Murdock reestablishing Congressional control over public land withdrawals.

We urge discontinuance of the present policy of the General Land Office in protesting and refusing applications for mineral patents in mining regions, and the technical and unreasonable requirements as to demonstrated mineral values prior to full development of the properties where the location of claims with respect to proven lodes and ledges is such that no reasonable doubt of this value for mineral purposes can exist. In this connection we urge a return to the former policy of encouraging the development of properties in such proven mineral areas through the liberal granting of patents.

We oppose the assumption by the General Land Office of the right to investigate and pass on the validity of metal mining locations on the unreserved public domain before any application for patent is made. Federal recording of location notices and proofs of annual labor should not be required.

In order that miners in Alaska may be permitted to mine the beds and banks of navigable streams in that territory we urge that the Act of May 31, 1938 (U. S. Code Title 48, Sec. 381) be amended to permit mining of such stream beds, subject to protection of the public right of navigation.

Congress should repass and finally adopt a resolution abandoning to the respective coastal States in which they are located, title to all lands below the line of ordinary high tide and to their mineral content, in order that the States' traditionally recognized right to these minerals may be finally established.

We oppose the proposal which has been made in Congress that the entire public domain be ceded to the respective states in which it is located.

RESOILING DREDGED LANDS

We view with disapproval the legislative measures recently enacted in local communities of California in an attempt to compel resoiling of dredged lands, as being physically impracticable, economically unsound, and as constituting an undesirable legislative precedent in every respect.

PRIMARY MINE FINANCING

We believe that—

(A) If present restrictions, both Federal and State, on the financing of primary mining ventures, through the sale of securities to the public, had been in effect fifty or more years ago very few small mines would have been discovered and developed; and the resultant large mines of the United States, which have supplied metals for war and peace, would have been non-existent;

(B) That in the mining division of the Securities & Exchange Commission there has never been employed a man with the proper perspective toward and experience in primary mine financing to guide the Commissioners in making their primary mining security decisions; and

(C) That as a result of present laws, rules and regulations and their administration, the primary mining industry is being strangled, and hundreds of millions of dollars of venture capital formerly available for mining enterprises in the United States are flowing into foreign countries which have no similar restrictions.

Therefore, in order to perpetuate and expand the mining industry of the United States so that this country will at all times have available from domestic sources an adequate supply of metals for domestic consumption and national emergencies, we recommend—

(1) That the mining division of the S. E. C. be immediately reorganized so that at least the man making final decisions in that department be experienced in the problems of prospecting for and developing and financing of primary mining ventures.

(2) That the S. E. C. laws be amended so that only the fraud section or sections of the present Federal laws, rules and regulations be applicable in offering and selling primary mining securities to the public, and that the various State laws, rules and regulations go no further than that in their requirements.

WATER POLLUTION

Water pollution is a local problem, varying widely in nature and extent, and best dealt with by State and local agencies, supplemented where necessary by interstate compacts. We oppose legislation vesting control over water pollution in a Federal agency with power to set rigid standards and to force compliance through action in the Federal courts.

VALLEY AUTHORITIES

We favor the orderly development of our waterways under the direction of the Army Engineers and the Bureau of Reclamation, provided that such projects are deferred until such time as they do not drain sorely needed manpower, materials and equipment from essential industry and are not in violation of the policies of the Employment Act of 1946.

We are, however, unalterably opposed to the so-called Valley Authorities program, which would divide our Nation into several separate regions, each under the control and dictation of a new set of appointed officers.

We believe the basic principles of such Authorities lead to the destruction of individual and State rights, and that the development of our waterways and the reclamation of our arid lands can best be carried out through existing Federal, State and local agencies working with private industry and private enterprise. We particularly object to the assumption by such Authorities of control over all natural resources and the operation and control of industries related thereto.

ST. LAWRENCE PROJECT

We oppose as needless and unjustifiable the proposed Great Lakes-St. Lawrence deep waterway and power project. The enormous ultimate cost, not at first apparent, would impose large tax burdens; the waterway would be of principal benefit to foreign products and shipping; the water power would merely displace more economical steam-generated power.

The project would disrupt great mining and metallurgical industries and other essential enterprises of the Great Lakes basin, where successful productive activities of a vast population are vital to the welfare and self-sufficiency of our country.

GOLD MINING

We again call attention to the serious difficulties the gold miners are encountering in their efforts to resume operations and to recover from the severe injuries resulting from the shut down imposed by WPB Order L-208. We specifically urge that legislation be enacted to reimburse the owners or operators of lode or placer gold mines for capital losses and unreimbursed costs resulting from this unique and drastic action by a governmental agency.

We further recommend that the right be granted to gold mine owners to export newly produced gold and to sell it in foreign markets under the laws of the particular country to which it may be shipped.

MONETARY POLICY

We continue to favor a currency with the traditional base of gold and silver with anticipation of stabilization of the prices of these metals eventually at levels that reflect their true world values.

TAXATION

Our Federal tax system should be promptly revised so that the taxes imposed shall not be such, in nature or amount, as will tend to dry up the revenues at the source, but will leave adequate incentive for investment, for business activities and for employment. This is essential for maintaining and creating the incomes from which the Government may derive its long-term revenues.

The law should be framed and administered to safeguard the interest of taxpayers as much as to obtain revenue for the Government. There should be a real endeavor to have law and regulations, in substance and in expression, such that they can be reasonably understood by taxpayers. The administration of the law should be such as to carry out the Congressional intent, and should not be distorted by hypertechnical interpretations which nullify or reduce the depletion and other deductions Congress intended to grant. The Congressional intent as expressed in committee reports should guide the administrative officers.

Taxable net income should be brought as nearly as practicable to the standard of net income as ordinarily understood, with time and nature of in-

come accruals conforming as nearly as practicable to good accounting practice. Every effort should be made to place the law on such a basis that standards for determining taxable income will be made stable for a considerable period of years.

Among the features of the law which should be revised are the following:

Corporate income tax rates and the higher individual surtax rates should be reduced to a point at which they will not, as at present, exceed the point of maximum productivity. Dividends should be taxed to individuals only to the extent that the individual's tax rate on the earnings involved exceeds the corporate tax rate. Intercorporate dividends should not be taxed. Individual income should in no event be subjected to an over-all tax rate exceeding 50 per cent.

In determining taxable gain, full allowance must be made for capital recovery. Losses of loss years should be fully deductible in determining the income of years subjected to tax. Carry-back and carry-forward losses should be computed in a manner which will eliminate discrimination. Taxpayers having loss years interspersed with profitable years should not be subjected to heavier tax burdens than those having similar aggregate income evenly distributed over the same period without years of loss. Particularly, there should be no discrimination against percentage and discovery depletion allowances. The taxpayer should be given every reasonable latitude as to amount and method of computing reasonable allowances for depletion and depreciation, and the tax benefit principle should be applied so that amounts will be considered as theretofore allowed only to the extent they resulted in a tax benefit to the taxpayer, or allowable to the extent they might have given a tax benefit. Costs of development, exploration and research should be allowed as part of the operating expenses of mines.

There are a large number of so-called technical and administrative amendments which should be considered and adopted by Congress at the earliest possible date, and because of delay in their adoption should be given retroactive effect.

While the excess profits tax has been repealed as to the future, there are points regarding it which should have consideration as to years subject to it. The relief provisions of Section 722 have bogged down and become of doubtful effectiveness, but we express confidence that the newly-created Excess Profits Tax Council will administer the provisions in accordance with the intent of Congress to give merited relief.

The excise tax on freight which was adopted as a war revenue measure should be promptly repealed. It is a particularly burdensome cost on the mining industry.

We commend the action of Congress in retaining the social security tax rate of one per cent and urge that this rate be continued until Congress has completed its study of the social security system. The rate should then be fixed at the lowest level required to defray the essential costs of the system.

GOVERNMENTAL EXPENDITURES

We commend Congress for the adoption in the Congressional Reorganization Act of a procedure which provides Congress with an effective control over expenditures.

The reduction of our tax burden to a point where it can be borne by the American people should not be prevented nor impeded by excessive or unwarranted expenditures either at home or abroad.

FREE ENTERPRISE

Free, private, competitive enterprise—by whatever name it is called—is the basis of the American way of life. It has brought to America the world's maximum production and highest standard of living.

Free, private, competitive enterprise requires:

The highest degree of personal freedom attainable under just laws impartially enforced.

Preservation of the incentive system.

Freedom to save and invest as we wish.

No arbitrary control by government.

The preservation of property rights.

Private, not government ownership.

No special privileges—for management, for labor, for capital.

Government by law and not by bureaucracy.

Adequate judicial review of findings of fact and law by Government regulatory agencies.

Retention of the sound principles voiced by the Declaration of Independence and the Constitution including the Bill of Rights.

No war economy now that the war is over.

The acceptance of competition for ourselves as well as for others.

Under this system—to which we wholeheartedly subscribe—American industry, once the problems of conversion are fairly solved, can move forward with confidence, develop new frontiers through technical and scientific progress, and produce and distribute better goods in greater volume at lower prices to more people.

Only under a system of free, private, competitive enterprise can we restore and preserve individual freedom.

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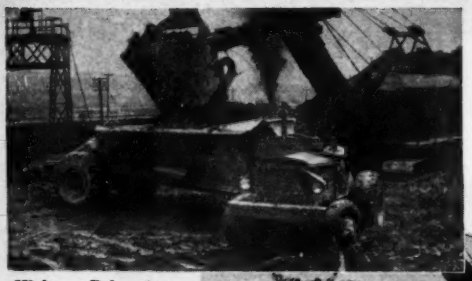

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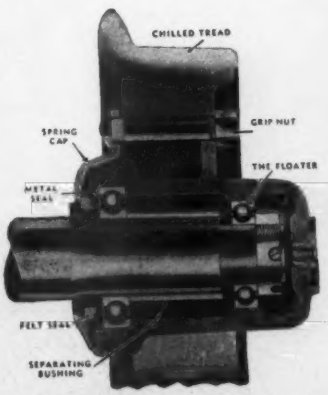

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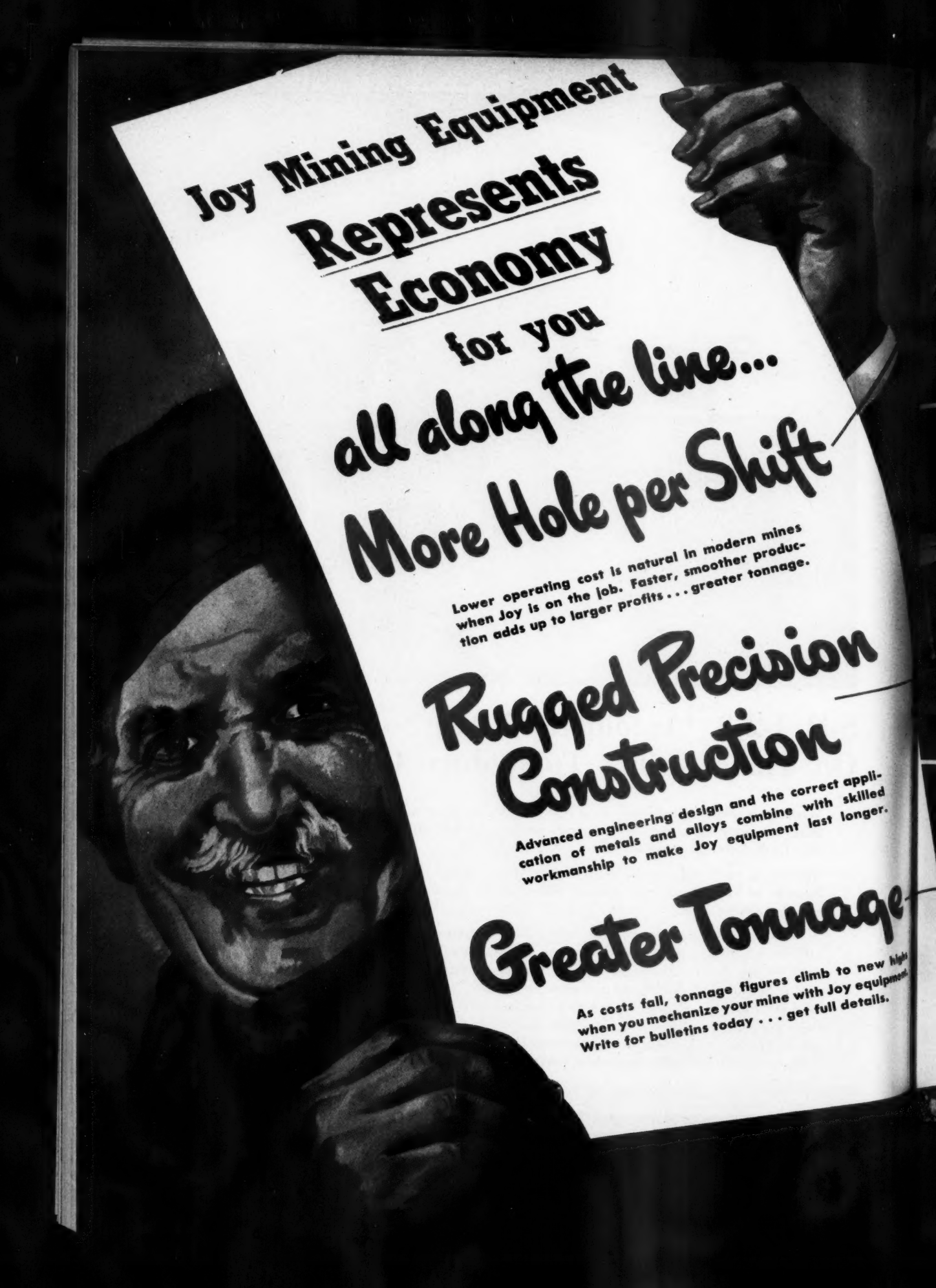
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Digest of Convention Papers

Presented herewith are brief abstracts from the convention papers. Due to space limitations, only the highlights of the addresses are given.

MONDAY MORNING

The Mining Outlook

World Economic Problems of Copper, Lead and Zinc

By James Douglas,
Phelps Dodge Refining Corp.

HAVING been closely connected during the war period with all phases of the copper, lead and zinc programs, opportunity was afforded me for observing the effects of the various means adopted in the emergency for the attaining of adequate production and orderly distribution of the three metals in both the domestic and international fields.

Today the general conditions surrounding the three metals are and will be for some time dominated by government actions in most instances running counter to economic forces. *Economic problems in the true sense do not exist today.* Since economic forces no longer work freely, as in "normal" times, the sole problems are those which revolve around and are dependent upon government action the world over.

Over the entire span of years since the last World War, and during any one particular period within this span, conditions were generally relatively unaffected by influences outside the natural laws of supply and demand and a free market. Now these natural forces are surrounded, both in the domestic and in the foreign fields, by all manner of arbitrarily established regulations, export and price controls, and they are further upset by disruptions of flow of materials, by dislocation of world currencies and by political trends of which, unfortunately, regulation and control are a part.

In addition to the problems inherent in Government control, on both a national and international basis, is the fact that world trade in all commodities, notably the metals, has just passed through a period of disruption and departure from movements which were generally characteristic of any past period of time.

Artificially low domestic metal price ceilings have been a distinct handicap to the Metals Reserve Company in meeting world metal prices. Flexibility in this respect has been lacking as evidenced by our failure, as pointed out above, to procure maximum amounts of lead and copper in the world market. At the present time, the new OPA extension bill has thrown further difficulties in the path of the Government purchasing agency and the confusion which has existed since June 30 has, undoubtedly, deprived our economy of much needed copper and lead.

Once our own economy is freed from price controls, I feel that United States importers will be able to meet foreign purchasing competition, as long as the need for imports to balance domestic consumption and supply exists.

Foreign purchases by Metals Reserve Company, after price controls are abandoned, will only mean further Government allocation of metals, for which some method of controls is necessary. I hope that you will agree with the general statement, that the Government, with the exception of establishing tariff on metals, should withdraw from the area of metal purchase, allocation and regulation immediately price ceilings are dropped.

The factors which have brought about the present huge demand have worked out just as should have been anticipated. The danger is that the current high level of demand will not be recognized for what it is, namely, a non-recurrent bulge, caused by the five-year backing up of normal requirements that in peace-time would have been satisfied as they arose. The excessive requirements in terms of any past figures, may not be satisfied for some years, although I believe that the great bulk of the demand will have been met by the end of 1947.

As a long-range estimate, it would appear that, barring a depression such as that which existed in the early 20's and the first half of the 1930's, consumption should approach a figure somewhere between, say, the last four pre-war years and the annual consumption rate of the period through which we are passing. Copper consumption of new metal may be expected to approach 850,000 tons, lead 800,000 tons and zinc 700,000 tons per year.

I do not believe that we are a "have not" nation in the extreme sense that cheaply produced metal imports should be permitted to flow in freely, our own mines closing down as a consequence, solely to conserve our resources for the next war. When that portion of a mining industry capable of supplying metal at reasonably free market price levels has once been developed, as ours has been, it cannot be subjected to prolonged shutdown without serious loss of resources. The value of a closed mine is completely destroyed.

I do believe that in the years to come, new techniques will uncover hidden resources not now known, but their development will take time and metal prices must be such, without the aid of Government financial assistance, as to encourage search, exploration, development and eventual extraction of presently concealed reserves. However, with the end of the present period of huge demand and a return to what might be termed "normal" consumption, in line with the figures already mentioned, and before new deposits have reached the productive stage, I do not believe that our domestic mines plus secondary sources can supply sufficient new metal for our needs, notably in the case of zinc and lead.

If I make no other point in this entire address, it is that in the future the mining industry should stand opposed firmly and irrevocably to any form of peacetime plan, regardless of the reasons advocated, which involves direct Government payments and bonuses for the three metals. Subsidies are alien to our form of Government. They are part and parcel of Government control and they are linked to a political theory which has as one of its bases, the disbursement of the wealth of all the people, in the form of public funds, to a group or groups specifically set apart from the national economy as a whole. Past experience has proven that Government acts, restrictions and controls once invoked during times of national stringency are difficult to remove.

As early as the Spring of 1945, after V-E Day, consideration was given by the interested war agencies to the partial abandonment of subsidies for the fiscal year 1945 to 1946, when such subsidies should become unnecessary to obtain metal production for the war effort.

The subsidy plan should be continued for one year, but as the amounts of metal realized from the higher subsidy brackets became surplus to requirements, these subsidies should be cancelled. Congress, in extending the OPA law for one year, wrote into the bill a provision making non-cancellable all classes of premiums. This comprised a rare instance in which Congress legislated in mandatory manner a part of a bill which, in other respects, was left to administrative judgment. Congress might better have insisted upon provisions that subsidies be removed when requirements no longer justified the expenditure of public funds for high-cost metal. Instead, excuse was found for obligatory continuation of the drain on the Treasury whether the metal was needed or not.

A year later in 1946, almost to a day from its commencement in 1945, agitation in Congress was begun to again extend the subsidy plan for a full year to June, 1947; and once more the plan was to be uncancellable.

A sincere effort to remove metal ceilings, and abandon subsidies as was done in the case of meat and dairy products, would have offered gratifying evidence of our lawmakers' recognition that further expenditure of public funds in peacetime for the benefit of one segment of the economy should not be tolerated.

You are familiar with the axiom that the "power to tax is the power to destroy." I am coining a parallel, namely that "the power to subsidize is the power to destroy." From Government aid, and subsidies, to control and regulation, to ownership and operation are the successive steps on the path down which experience and history have proven we must inexorably travel. The moment natural economic forces are tampered with, metal subsidies being merely a device to overcome such forces, we enter upon a dangerous road whose ultimate end is Government planning for the industry involved. If a sufficiently large portion of the nation's industry succumbs to the financial palliatives offered by the Federal Government, so thoughtlessly, easily and in many cases selfishly accepted, this nation will pass to a socialistic form of government or worse.

The Future of Gold

By Donald H. McLaughlin, Pres., Homestake Mining Co.

THE stability of gold. Acceptance of gold as a token of inherent value is so common a characteristic of all manner of men that there is scarcely any part of the world in which an individual possessing gold would not be able to exchange it advantageously for the goods or services he desired. This is not theory; it is simply an observation of a human trait that comes as near to being a law as anything can in the social sciences. Consequently, gold is trusted as a basis of exchange and as a measure of the value of currencies to a degree that is not even approached by any other means. Confidence in gold far exceeds confidence in governments, and possession of gold is rightly regarded as a better security for wealth than the holding of promissory notes.

No other metal or commodity possesses gold's qualifications. And no promissory note of any government can command the same wide-spread acceptance or even deserve the same degree of confidence.

The gold miners these days may have their troubles, but in my judgment they need have no fears about the steady persistence of demand for their product. The world will continue to want it and over the years will undoubtedly continue to pay enough for it to keep gold mining active and attractive for new ventures as well as profitable for established and stable operations.

The spread between the price of gold and the cost of mining and recovering it from its ores that prevailed in the period between 1934 and 1941 was enough to attract money into new ventures and to promote exploration and mine development throughout the world on a scale that removed all danger of shortage of ore for some decades, yet created no threat to the value of gold through over production. The increased output seemed about in balance with the world needs until the vast increase in paper money, the shortages of goods, and the drop in gold production resulting from the closing of mines in the United States and from lack of labor and materials in other fields, as well as the restrictions on sale of gold, exchange controls and abnormal trade conditions in nearly every country during the second World War, again disturbed the equilibrium and raised new doubts as to the ultimate value of the world's paper currencies. There now seems abundant indication that gold is preferred even to dollars at the present Treasury price, and that unless there is marked change in the factors listed above, even the strongest paper currencies may be forced eventually to recognize a higher price for gold.

At its peak in 1941, our gold stock amounted to about 650,000,000 ounces, upon which a value of 22.8 billion dollars was placed. In this immense sum was included the original value of the gold held in 1933 plus a profit of $2,800,000,000 from the write-up, as well as the profit on the gold collected from private holdings for which the Treasury paid $20.67 per ounce but entered on its books at $35. (Whatever "benefits" the gold miners received in the first years after the devaluation of the dollar were surely small in comparison with the "profits" the Treasury took into account!) In addition to this, however, gold amounting to about $14 billion was acquired between 1934 and 1941. Some $1,200,000,000 was obtained from domestic mines, but the rest came from abroad, of which $4,917,000,000 was in settlement for the excess of exports over imports during these years.

In many ways, this was truly the most fabulous investment in history. As an investment, it makes sense only if the gold eventually will be accepted for goods and services comparable in value to those we gave up to acquire it. Obviously, it is vital to us to preserve the power of gold to restore the wealth for which it stands.

In the long run, the value of our gold will be best protected by allowing it to function as a medium of exchange instead of a means of storing inactive wealth. If we follow the same policies that prevailed after the first World War —and to date they seem much the same— we shall have the choice of parting with our goods for paper, or making an even more outright gift of them, or accepting gold at some price that makes our goods reasonably competitive in the world's markets. Carried to an extreme, such a procedure results in impoverishment or on a naive dependence on storage of wealth in gold. It is no indication of lack of confidence in gold to feel that excessive accumulation through one-sided trade inhibits its true function. A situation of this sort tends to promote devices such as the restricted trade agreements and barter promoted by the Nazis and now by their successors, the Soviets. Although this would probably do no harm to the ultimate value of gold, it might during a critical period seriously lessen the effectiveness of *our* gold. The only safe solution is preservation and strengthening of truly multilateral trade.

As gold producers, we are, of course, primarily concerned with the spread between the price we receive for our metal and the cost of mining and extracting it from the ores. Traditionally, the spread is greatest and profits are best in times of depression, when labor is plentiful and most efficient, and the cost of supplies and equipment required for the operations is low; and the present difficulties of the gold miners are in line with the reverse of this pattern. Inevitably, profits throughout the entire industry decline and marginal producers suffer so acutely in times like the present that consideration of measures for relief is properly called for.

Steps that might be taken domestically include (1) technical improvements to reduce costs, and to improve recoveries; (2) a premium price for gold produced from our own mines; and (3) relief from excessive tax burdens.

Possible means of relief for the gold miners of the country that would inevitably involve international relations are (1) an increase in the price in paper dollars paid for gold by the U. S. Treasury, (2) coinage of gold at some stated price with permission to citizens to acquire and to hold it, and (3) granting of permits for exportation of gold, or of currently produced gold, for sale abroad at whatever price above the Treasury price it would command.

Circulation of gold in coins would be a most interesting experiment, for it would promptly reveal where paper currencies stood in relation to gold. Gold at present is sufficiently plentiful to permit a substantial part of it to be coined without hardship. If issued at a fair price in terms of paper currencies, it should remain in circulation; and, if hoarded, it should be regarded as fair warning of the weakness of the paper and a sign of the need to correct the basic factors that create such weaknesses.

An increase in the price of gold is not likely to appeal to many in power while inflation is being fought on the domestic front, nor is it probable as long as ample foreign credits are available through loans or more or less concealed gifts, for through them enough paper will be available to settle the excess of exports over imports. This situation, however, is not one that can persist indefinitely, and changes favorable to the gold miner should eventually result.

By far the best solution both for the country and the gold miners would be the avoidance of inflation through economies without tampering with the value of paper currencies in terms of gold. But even if this is not achieved, the value of gold is certain to remain as a stable and persistent standard against which shifting currencies are measured.

—■—

The Future of Silver

By Hon. Abe Murdock, U. S. Senator from Utah

THE future of silver will depend chiefly upon four things:

(1) the continued recognition by Congress of the fundamental need for its use as

- (a) metallic backing for paper money, based upon the redemption concept, and the circulation of silver dollars concurrently with silver certificates, and
- (b) fractional currency, or subsidiary coins, of a metallic content comparable to that of the silver dollar, and
- (c) the realization by foreign countries, especially those of the Near East and the Far East, of the inadequacy of paper money for their day-to-day transactions;

(2) the continued and, preferably, increased use of silver for industrial purposes, and

(3) world recognition of the indispensability of silver in all currency systems for circulation as coin and as backing for paper money;

(4) the establishment and maintenance of a stable world price of at least $1.29 an ounce.

While the industrial demand for silver is now a major factor in the marketing of the metal, *it is not as important nor is it likely to become as important as the monetary demand.*

While the normal pre-war production of silver for the past two decades has averaged around 260,000,000 ounces a year, it is doubtful that such production will be again attained for several years. During the war years our mines were unable to conduct the necessary exploration work ordinarily performed ahead of production, and a period of at least two or three years will be required to accomplish such exploration. Until this activity is again in full swing, along with the attendant production of silver, we will not be able to accurately appraise the production of either foreign or domestic silver.

The consumption demand for silver is of greatest importance to you. If the law of supply and demand could operate freely today the market price of silver would probably go above $1.29 an ounce. The fact that legislation exerts the greatest single influence on the price received by the miner reveals the necessity for the establishment of a closer relationship between the producers and their Senators and Representatives in Washington.

During the past 10 months of the present Congress, telegrams and letters arrived in Washington almost daily from retail jewelry firms located in every state of the union. The chief source of the propaganda was the Silver Users Emergency Committee of New York City which was organized several years ago by various

segments of the silver-using industry such as silversmiths, brokers, jewelry manufacturers, photographic supply manufacturers, and others.

The sort of propaganda engaged in by the silver-using industry is expensive. They had lobbyists in Washington during the greater part of the time while Congress was considering the recent legislation to authorize the further sale of Treasury silver for industrial uses. These lobbyists represented chiefly silverware, jewelry, and photographic supply manufacturers. They canvassed the offices of Senators and Congressmen representing all sections of the United States. They were extremely active, but failed in their purpose—to influence the passage of legislation authorizing the sale of Treasury silver at 71.11 cents an ounce for industrial uses.

The monetary price of $1.29 an ounce for silver was established by the Act of April 2, 1792. This Act stipulated that 371¼ grains of pure silver was worth a dollar and would serve as the monetary unit of our Government. This monetary price has never been changed. Moreover, it has been reaffirmed in several subsequent acts of Congress.

The monetary value of the silver in our currency system as of June 30, 1946, was $3,508,800,000 or approximately 2,713,898,986 ounces. No other country on earth has as much silver in its currency system as has the United States. Furthermore, the United States Government is probably the only country in the world able to stabilize and maintain a world price on silver.

I have deplored on many occasions on the floor of the United States Senate the unfair treatment of silver producers because they are paid less than the monetary price of $1.29 an ounce for their silver. I can assure you that I will continue my efforts to correct this unfair practice of our Government toward the silver producers of this country.

The United States Congress now sets the "world price" of silver and gold. Why should not the "world price" of silver—that is, the commercial price—be based upon the monetary price of silver in the United States currency system?

I am very hopeful that appropriate consideration will be given at an early date to the rehabilitation of silver as money throughout the universe and believe that the present floundering world will soon come to realize the futility of attempting to restore economic order without the utilization of both gold and silver as currency and of the wisdom of rehabilitating these precious metals as an integral part of the economic machinery on which humanity depends for the conduct of commercial relations.

Our Federal Tax Problem

By **Henry B. Fernald**
Loomis, Suffern & Fernald,
New York City

I SHALL try briefly to tell you something of what is in my mind as I look forward for 5 or 10 or 20 years at the federal tax problem—first in its general aspects and then as related to mining.

We have fought and won a great war and now face the problems of peace. We came out of the war with our government debt swollen to almost $300 billions, about $2,000 for each man, woman and child in the country. But worse than that, we have come out of the war with a vast government machine which strenuously resists any endeavor to reduce its size or curtail its power.

I think we can face our post-war tax problem confident of our ability to work it out in a sound and sensible manner, if we are determined that this is what shall be done.

Our present federal tax problem, simply stated, is how to raise the revenues to meet government expenditures without imposing taxes which in nature or amount will tend to dry up the revenues at the source. This is the problem we now face and shall face for many years.

Let us look briefly at a few major features of the general problem.

(1) EXPENDITURES

The President's budget message of last January estimated for the fiscal year 1947 (July 1, 1946, to June 30, 1947) expenditures, aggregating $35 billions, which may be briefly summarized as follows:

	Millions
General government	$1,565
Interest on the public debt	5,000
National defense	16,000
Veterans' pensions and benefits	4,208
International finance	1,754
Aids to agriculture	501
General public works program	1,083
Social security and retirement funds	1,053
Anticipated supplemental appropriations	875
Expenditures based on proposed legislation	1,500
Refunds	1,585
	$35,124

Without argument as to the need or desirability of spending all this amount, let us have in mind as recurring year after year expenditure budgets of not less than $25 billions a year, unless serious, definite effective steps are taken to reduce them below that amount.

(2) REVENUES

The budget estimates for revenues for the fiscal year 1947 were roughly:

	Millions
Direct taxes on individuals	$12,874
Direct taxes on corporations	8,192
Excise taxes	6,344
Employment taxes	1,856
Customs	434
Miscellaneous receipts	3,239
	$32,939
Less—Appropriations to federal old-age and survivors' insurance trust fund	1,426
Net receipts	$31,513

(3) INCOME SUBJECT TO TAX

Valuable analysis of income figures was presented by Secretary Vinson to the Senate Finance Committee, October 15, 1945, in Treasury estimates of taxable incomes for the calendar year 1946. This showed—

I *Individuals*

	Billions	Percent
On an estimated "national income" of	$130	100
"Net income" under the tax law	95	73
Exemptions	52	40
Taxable income	43	33

Taxable in income brackets—

	Income billion	Per cent of Nat'l. Income	Tax billion	Per cent of tax
Above $10,000	$5	4	$3	28
$2,000-$10,000	8	6	1.9	18
0-$2,000	30	23	5.8	54
	43	33	10.7	100

II. *Corporations*

Taxable income	$16.5 billion
Tax at 38 per cent	6. billion

The particular point I want to make here is that all the tax obtainable from the $5 or $6 billion of income in brackets above $10,000 would not be enough to pay the interest on the national debt. When our government was running on about $3 billion a year we collected about $1 billion from individual income taxes, largely from the higher incomes, with the lower incomes virtually free from tax. But with budgets of $25-30 billion, only a small part at most can be collected from the higher individual incomes. Moreover, the corporation income figure of $16½ billion (probably high for this year) can only yield a relatively moderate contribution to a $30 billion budget.

A very heavy load must fall on the lower individual incomes. In fact, we might say that it is the lower incomes which must bear the burden of swollen Federal budgets since it is the lower incomes which in the aggregate constitute the great bulk of our national income. I think if the people at large understand this situation, there would be a very insistent demand from them for drastic government economies.

(4) IMPACT OF TAXATION

(Investor with $18,000 of taxable income)

If the corporation can earn 10 per cent on its investment this will yield such an investor net only 3 per cent—not enough to make a risk investment worthwhile. If the corporation can earn 20 per cent the net to the investor would be only 6 per cent. Is this enough to warrant the risk? We are speaking of average yields—good years and poor. To earn an average of 20 per cent the corporation might have to earn 40 per cent or 50 per cent on its capital in good years to offset the losses of bad years. Furthermore, we must expect that for taxation all losses will be fully recognized as deductions from taxable income, and that taxes will be imposed only on true net income of the enterprise. Otherwise the net yield to the investor will be further impaired.

Can we against present tax rates expect enough investment to give the employment, the production and the government revenues desired? Take pencil and paper and do some figuring. Get your answer to this and tell your representatives in Congress what it is.

First and foremost is the principle that income taxation should fall only on profits and not be so applied as to tax capital. Then the system and rates of taxation imposed on profits must be such as wil' leave to the investor, after taxes, the opportunity for profits sufficient to justify the risk, the skill, the effort, and

the investment required. The following points are essential to carrying out this principle:

1. *Depletion must be fully recognized.*
2. *Full and adequate allowance should be made for tax-free recovery of capital investment in plant and equipment. . . .*
3. *The losses of poor years should be fully offset against the profits of good years. . . .*
4. *Exploration, development and research should be allowed as operating costs or expenses. . . .*
5. *The stockholder should also be permitted to recover tax-free his investment in capital stock of a mining corporation.*
6. *The cumulative double taxation of corporate profits distributed as dividends should be eliminated. . . .*
7. *No undistributed profits tax should be imposed. . . .*
8. *The tax laws, regulations and administration should be simplified and made more intelligible to ordinary business men as taxpayers. . . .*
9. *A stable tax system is required.*

TUESDAY MORNING

General

Administration of the Premium Price Plan For Copper, Lead and Zinc

By Jesse L. Maury,
Office of Price Administration

FOUR years ago Don Wallace, John Sumner and I were privileged to speak to this Congress in Salt Lake City. At that time the Premium Price Plan was new to all of us, but we stated it to be our intention that we would make its administration sufficiently flexible to enable maximum production for war in this country. On May 6 of this year Paul Porter wrote to Senator Wagner, Chairman of the Senate Banking and Currency Committee.

(Here Mr. Maury read Mr. Porter's letter which reviewed the accomplishments of the Premium Price Plan as regards production of lead, zinc and copper mines and the financial statement of amounts paid in premiums. Mr. Porter felt that the plan had saved "at least several billion dollars" and had been quite successful in spite of criticisms expressed in testimony before the Senate Banking and Currency Committee. Mr. Maury followed this letter with a reading of an editorial from the Mining Congress Journal of June, 1946, written by Charles Willis, which indicated that this plan "probably was one of the most sensible programs worked out by a Government agency.")

Since January of this year the industry has been convulsed by various stoppages of production, price increases, a period of uncontrolled prices during which no one knew whether premiums would be continued or not, and a return to controlled prices with premiums reestablished retroactively so that no effective lapse in their payment occurred. These convulsions have called for a number of adjustments in Government policy which have been made public through a series of releases and directives.

Since early this year the Congress has taken a considerable interest in the operation and the effect of the plan. This interest is reflected in the final terms of the bill re-establishing the Office of Price Administration, in that it instructs the administrators of the plan to make adequate allowances for depreciation and depletion and to make adjustments in the operation of the plan designed to encourage exploration and development.

We have accordingly reviewed our practices in these matters to determine what changes might be designed to put into action the congressional instruction.

First as to the general problem of depreciation and depletion. We have consistently taken the position that in our determination of costs we work at the operating level, using only those costs normally used in calculation cut-off grades. Following this practice we consider only operating costs, leaving in the operating margin the indeterminate book charges which are usually allocated in corporate accounting procedures.

These factors for depreciation have been straight allowances in cents per ton of ore or per pound of metal, varying with the type of mill or smelter which the mine supplies. They are applied only when the processing plant is integrated with the mine for which a margin is being calculated and when all costs of its operation are loaded on the ore from the mine. We have not been allowing any charge for mine plant, since we considered this a minor item common to all mines and just as well left unseparated in the margin.

With respect to depletion, we distinguish between lessee operators and owner operators. For lessees, we consider royalties which they pay to be a cost to them, and we handle it as a cost in our calculations. At the same time, however, we consider that this royalty compensates the property owner for depletion of his ores, and so we add nothing to the lessee's margin for depletion.

For owner operators, we add 50 per cent to the basic margin, calculated for lessees, to compensate for depletion of owned ores.

Before the end of the convention OES Directive 137 was received providing for a new and separate class of premiums to encourage exploration for copper, lead and zinc. Under terms of the new order, mines producing less than 600 tons of these three metals in the 12 months ending June 30, 1946, are provided with an exploration premium of 1 cent a pound of metal produced, not to exceed $1,000 a month. Such premiums are to be paid for exploration in properties part of or contiguous to the property which receives the premium although in exceptional cases premium can be paid to properties not adjacent.

In respect to the larger operators, the directive states: (1) exploration premiums shall not be paid to mines which earn adequate margins without other premiums, (2) exploration premiums shall be assigned only for specific projects, (3) such premiums shall not be considered as income to the operator, (4) all such premiums should be spent currently and all unspent by December 31, 1947, should be returned to the RFC.

(Provision is also made for increased allowances for development, for depreciation of mine plant, and for depletion of ores containing precious metal values.)

United States Program for World Trade and Employment

By Karl L. Anderson,
International Resources Division,
Department of State

I WELCOME this opportunity to meet with the American Mining Congress and to address the Congress on the general subject of the United States' program for the expansion of world trade and employment. It seems to me particularly appropriate that such a subject should be discussed here, because it is my conviction that there is no industry in the American economy which has a greater stake in the success of that program than does the mining industry. Not too many years ago—in the early 30's—this industry had experience in the consequences of a world-wide contraction in trade and world-wide unemployment.

Let us not deceive ourselves about the gravity of the situation confronting us. It is significantly different from the prewar situation. Even then, of course, partly as a result of conditions of depression and of the efforts of different countries to combat it, but partly also the product of pure economic nationalism, there had grown up a mass of excessive tariffs, preferences, quotas, embargoes, subsidies, exchange controls clearing agreements, barter deals, and other kinds of discriminations and restrictions upon international trade. Although we were able through our trade agreements to moderate many of the more extreme restrictive practices and gain a notable revival of our commerce, there remained obstacles great enough to prevent effective functioning of the world economy. Now the world economy has been disrupted by war. The financial resources of some nations which were among the richest have been consumed. The productive capacity of others that were industrially powerful has been virtually ruined. Whole populations have been impoverished. Meanwhile, economic controls of the closest kind have been imposed by governments everywhere in the world.

On December 6, 1945, the Government of the United States issued its Proposals for Expansion of World Trade and Employment. These proposals, developed over a period of more than two years by experts in various agencies of the Government, and approved by the President, are intended to provide a basis for discussion leading toward an international conference on trade and employment. They were prepared in the conviction that by acting together in the direction of removing barriers to trade there is every possibility that the countries in the world can achieve high levels of production, employment, and consumption. The proposals, which deal in detail with all the principal forms of restrictions upon trade and exchange, call for the reduction or removal of excessive barriers.

In regard to general commercial policy, we stand for the removal of discriminations and the reduction of trade barriers. We specifically urge that the members of the International Trade Organization should enter into arrangements for the reduction of import and export tariffs and the elimination of tariff preferences.

We stand similarly for the abatement of restrictive business practices in international trade. It is our view that there should be individual and concerted efforts by countries to curb practices such as combinations or agreements to fix prices,

divide markets, limit production or exports, suppress technology, exclude enterprises from particular fields, or boycott or discriminate against particular firms, which have the effect of inhibiting the expansion of production, trade and employment and of preventing equal access to markets and raw materials.

The United States, and for all practical purposes, only the United States, is in a position to assume the initiative. Unless we are prepared to take the lead in bringing about actual reduction of trade barriers we can hardly expect such action by others.

This is the place of the reciprocal trade agreements. They provide an instrument well adapted to the purpose. Through them concessions may be offered to other countries, but only in exchange for satisfactory concessions by them. The instrument is powerful, especially powerful under the conditions of today. Behind it lies the richest market in the world and by far the most bountiful source of supply.

I have scarcely mentioned the position of the mining industry in this context. The broad alternatives, however, are plain enough. Periods of war apart, never within living memory or the reach of statistics has the mining industry been prosperous except when all world trade and industry were prosperous. Never has it failed to prosper when commerce was active generally. The prospects must be estimated accordingly. If our efforts in the sphere of international commerce come to failure, and there are too many obstacles and dangers to assure that they will not fail, then the outlook is grim. If, on the other hand, we achieve what we seek, the outlook is good. Consumption will be heavy. There will be some changes in our export-import position: exports of steel will be larger than before the war; exports of coal are likely to be larger and over a broader area; there will be substantial imports of copper, lead, and zinc. Imports under the conditions that will prevail in those circumstances will not do damage. They will come by way of response to levels of demand higher than domestic production can satisfy, not by way of threat to domestic prices and production. Prices will be high, as high as they can be within the willingness and ability of buyers to pay and within competitive range of rival materials. Subject perhaps, to such factors as availability of labor and ore reserves, the domestic mining industry will be active and prosperous. That will be good. It will enable the mining industry to contribute toward the welfare of people in peace as it did toward our strength in war. And this, after all, is the real purpose for which that great contribution was made.

Mineral Raw Materials for Future Security

By Colonel O. O. Niergarth
Representative of the Army and Navy Munitions Board

FOR years the military have been interested in the stockpiling of critical materials. Since 1921 the departments have worked toward the development of such a program.

The Act of June 7, 1939

The Act of June 7, 1939 (Public Law 117, 76th Congress), was the first approved legislation having as its major purpose the stockpiling of strategic and critical materials for national defense. The passage of this act followed studies made in late 1938 and early 1939 by the Army and Navy Munitions Board with the assistance of the Interior and State Departments and other interested agencies. This act provided for:

The determination of which materials were strategic and critical.

The determination of the quality and quantity of each to be stockpiled.

The procurement of stockpiles with funds appropriated pursuant to the authorization contained in the act.

The storage, care, handling and necessary rotation of stockpiles.

The release of the stocks for use only upon order of the President in time of war or threat of war.

Purchases to be in accordance with the "Buy America" act.

By mid 1940 it became evident that the Act of June 7, 1939, having been designed to provide for the accumulation of stocks in a peacetime market for future use, was inadequate to meet the actual needs of the times. With Europe already at war, heavy war orders were being placed in this country by France, England and other countries. Furthermore, our own defense program was assuming large proportions and the total needs of industry for raw materials were becoming so vast that the already interrupted normal channels of foreign trade could not supply them. It was apparent that stockpiling must become a secondary consideration: the primary problem was to stimulate the flow of domestic and foreign supplies of many materials so that current needs would be met.

During World War II it was necessary to import some 60 raw materials, many of which were obtainable only from foreign sources. Others could not be produced in sufficient quantity in this country to meet the requirements, even with subsidies and other incentives to production.

These deficiencies, together with requirements to meet the increased industrial demand in the period necessary to obtain maximum production of existing mines and facilities and for the development of stand-by and marginal facilities and resources, can be met only by the acquisition and stockpiling in time of peace, of these materials.

Now let's examine the new Public Law 520 and compare its provisions with those of the Act of June 7, 1939, which it amends:

Determinations are still made by the Secretaries of War, Navy and Interior as to those materials to be considered strategic and critical, and the quantities and quality to be stockpiled.

Provision is made for the establishment of industry advisory committees to advise the Secretaries of War, Navy and Interior, and any agencies through which they may operate under the act, with respect to purchase, sale, care and handling of stockpile materials.

Provision is made for purchases to be made by Treasury Procurement at the direction of the Secretaries of War and Navy, as before, but it now is stipulated that purchases are to be made with due regard, insofar as practicable, to current industrial demands.

Provision is made for the release of materials from the stockpile, under carefully restricted conditions, when no longer needed because of revised determinations. This provides an opportunity for orderly liquidation of stocks which at some time may be found to be genuinely surplus to the needs of national defense, but at the same time precludes the misuse of the stockpiles for the influencing of markets or for other undesirable purposes.

General release provisions, while differently worded, remain substantially as before, namely, on order of the President, or such agency as may be designated by him, in time of national emergency involving the common defense.

In the new law the needs of civilian industry are given first priority on surplus materials available for transfer.

The new act retains the previous provisions for research and development by the Interior Department, and now carries a parallel provision with respect to the Department of Agriculture.

This act we believe provides a workable mechanism for the acquisition of adequate stockpiles for national defense purposes, subject, of course, to the limits which may be imposed by the availability or non-availability of appropriated funds.

The strategic materials committee set up by the act has determined that we should stockpile critical materials to the value of approximately $2,100,000,000. Five years has been established as the time within which we hope to complete this program.

I am not at liberty to divulge at this time the materials which are under consideration for purchase (under the initial appropriation of $100,000,000). I would like to repeat, however, the words of Mr. Richard R. Deupree, chairman of the Army and Navy Munitions Board, as voiced to representatives of the American Mining Congress a short time ago in respect to the board's operations under the act.

"It will be the policy of this board to procure these materials in a systematic and orderly manner, mindful of the economy of our own and other countries. The fact that this stockpile will be accumulated over a period of time gives us considerable leeway in the procurement of materials so that there should be little, if any, disruption, to our own domestic economy. The board will be very mindful of that situation. There will be no hard and fast rules regarding the acquisition of any given material. Naturally, our objective is a balanced stockpile to be obtained in an orderly fashion."

INDUSTRY VIEWPOINT OF METAL SUBSIDIES, TARIFFS AND STOCKPILING—

Copper, Lead, Zinc, Quicksilver, Tungsten and Antimony

COPPER

E. R. Lovell, President
Calumet & Hecla Cons.
Copper Co.

Evan Just, Editor
Engineering Mining Journal

E. R. LOVELL

AT THE outset it should be understood that the views that I shall express relative to stockpiling, the copper tariff and subsidies are those of the Michigan copper industry. Although I have not canvassed high-cost producers in other districts, I have reason to believe that their opinions in many cases are similar to ours.

There are certain general considerations affecting stockpiling, subsidies and the tariff. Our tragic mistakes of the past have shown us that in times of national emergency this country must be self-sufficient in all the materials necessary for modern warfare. Copper is one of the most important of these materials. By the nature of its occurrence and the methods of extracting it, rapid expansion of production is impossible. Therefore, two general courses are necessary:

First, we must accumulate a supply of copper dedicated solely to use during the initial stage of a war, to be utilized while production is being shifted from peace-time uses and, at the same time, expanded for the requirements of war.

Second, we must take such steps as are necessary to maintain maximum production during an emergency.

Stockpiling has been recognized as the best method of accumulating a supply, but it follows that in order to fulfill the purpose for which the stockpile was created, it must be kept inviolate until it is needed for war.

To keep a maximum production available for an emergency, it is imperative that the producing industry be operating when an emergency arises; but copper is a natural resource and continued operation inevitably reduces the presently known supply. Since this supply must be replaced as it is used, it is essential that there be a continuing incentive to discover new reserves and to develop new mines. In this country peace-time production adequate to supply normal demands would be the minimum that would permit any degree of self-sufficiency during war. Should a war occur, such production would permit of expansion, the stockpile during the interval acting as a cushion.

Metal subsidies are a method of achieving the conservation of our natural resources and of insuring adequate materials for national defense. Subsidies are a means of transferring a part of the cost of a commodity from a small group to a large group. Since one of the main reasons for keeping copper prices up is to protect the general public during an emergency, it does not seem unfair to transfer a part of the cost to the taxpayer through continuation of subsidies; but the nature of subsidies should not be overlooked or forgotten and the general price level must be kept high enough so that the ultimate consumers (who, after all, are the same group as the "general public") bear most of the cost.

The Michigan copper district, for example, still has large deposits of low-grade ore. Because this district is to a great extent covered with a heavy overburden, the possibilities of locating other high-grade orebodies have by no means been exhausted. This is true of many other districts. However, the exploratory work necessary to locate additional orebodies would not be carried on if mining were discontinued through elimination of the subsidy.

Tariffs are grounded on the basic law of self-preservation, and help to reserve the domestic demand for the domestic consumer. The copper tariff is necessary if our low-grade reserves are to be realized upon as a national resource in case of an emergency. It must be considered from a long-range point of view, and should not be adjusted for short-term variations. The costs of the lower cost foreign producers should be compared with those of the marginal domestic mines since it is low-cost foreign copper that may be expected to enter this country. When this happens, it follows that high-cost domestic production is replaced.

EVAN JUST

THE copper industry (apart from the Michigan group, whose attitude is portrayed by Mr. Lovell), has the reputation of having a broad area of disagreement over tariff; consequently, nobody in this audience will be surprised when I report that the unanimity within the industry is not impressive. As a matter of fact, the copper industry's lack of cohesiveness on tariff matters is so notorious that I believe some surprise will be occasioned by describing the narrowness of the area of disagreement. On the one hand, I find nobody who foresees conditions that make him believe outright free trade would be realistic.

On the other hand, I find nobody who believes that the copper industry would be in a sound position if we should presently get rid of Government imports and price control and find our current demands for metal in excess of domestic output kicking the price up to four cents above a foreign price of 16 cents or more.

In short, most of the producers with whom I have had contact consider the logical domestic price under foreseeable conditions to be between 14½ and 16½ cents. They believe that the industry would be injured more than helped by prices outside this range.

Furthermore, I have found unanimous disapproval of the substitution of a direct-subsidy system, similar to the Premium Price plan, for tariff protection, in whole or in part. It is regarded as having an inevitable tendency to subsidize inefficiency, and as having been administered consistently with an eye to prevent profits rather than to foster maximum productivity.

Thus, based on current thinking, any compromise on the tariff question that could possibly enjoy the support of the majority of copper producers must involve continuation of the present method of tariff protection, at rates between two and four cents. However, even though this area of possible compromise is fairly narrow, it includes important differences of opinion. A considerable segment holds adamantly for the status quo, on the grounds that the full four cents is likely to be needed at times, and that arrangements to flex the duty cannot be trusted. Another important group believes that four cents is a shut-out rather than a trading tariff, too high to be realistic in view of their belief that we shall not or should not be completely self-sufficient in the future. They regard a shut-out tariff as incompatible with our position as a creditor nation and our international sponsorship of reducing trade barriers. They also view four cents as unduly burdensome to consumers in case imports become substantial, tending to invite dissatisfaction and substitution.

A third element holds that in the midst of depression, the domestic industry is entitled to whatever tariff protection will assure it a monopoly of the domestic market. However, they believe that there are times, like the present, when the industry could well afford to share the domestic market with foreign producers and might even be harmed by the high price levels that four cents above the foreign price might bring. This group would welcome frequent alteration of the margin of protection by Congress, according to changing conditions.

The producers consulted are unanimously in favor of a large Government stockpile of copper as a national defense precaution. However, there is great diversity of views as to the sources from which it should be acquired. One extreme holds that it should be purchased entirely from domestic sources as an aid to domestic mining. The other believes just as firmly that it should come entirely from abroad so as to avoid depletion of not-too-plentiful national reserves and to aid in balancing foreign trade. A middle position is that the judicious apportionment and timing of purchases between foreign and domestic sources could do much to create desirable stability in the industry.

I shall wind up this discussion with two opinions of my own. First, I believe that receptivity toward making protection of domestic industry flexible would be much greater if Government agencies had displayed less crusading zeal and more impartial common sense in performing their functions. The impetuosity with which OPA has sought to limit profit even to the extent of hindering productivity, has destroyed industry confidence in the Premium Price Plan or anything resembling it. Likewise, the holy fervor with which the State Department crowds the Reciprocal Trade

program in the direction of free trade convinces protectionists that any willingness to go along with Executive tariff modifications under certain conditions would not be reciprocated if conditions should change.

Second, I believe that the anti-trust terrorism which the Government impresses on the copper industry is a serious deterrent to sound industry policy making. Copper producers have every reason to believe that any collusive action whatsoever might bring on either criminal prosecution or some of the mud-slinging which the Justice Department expertly uses to smear the reputations of its prey. Moreover, what kept the world copper industry in sound condition during the 30's, and caused our four-cent duty to be only partly utilized, was reasonable international cooperation between producers.

I have faith that if such international cooperation were to be encouraged, producers would profit by the lessons of the past, and learn to use their powers to better and better public advantage. However, across this route our heavy-footed Government at present maintains an impenetrable road-block. I am unable, therefore, to suggest any plan of protecting domestic industry that is reasonably acceptable, workable, and does not contain serious defects if we must face declining self-sufficiency.

LEAD

By **Andrew Fletcher**, Ex. Vice Pres.,
St. Joseph Lead Co.

IN connection with the lead situation, it seems to me that the two points of interest are: (1) Why does the lead shortage exist, and (2) What is going to be done about it?

At times a brutally frank statement is necessary —I feel that the shortage today is in a very great measure due to the governmental controls which existed on lead during the war period and are continuing today, coupled with the fact that certain government agencies have either refused or have been unable to accept the advice of the lead industry.

Domestic mine production is in part handicapped, as we all know, by the lack of adequate labor, but basically in my opinion, by the setting of an OPA ceiling price which is too low in relation to the value of lead to the domestic economy. At the present time, the lead market outside of the United States is established at around 2 cents per pound higher than the present OPA ceiling of 8.25 cents New York. Unfortunately, certain government agencies believe that the Premium Price Plan, wherein the average cost for lead is over 10 cents per pound, offsets the need for a higher ceiling price than 8.25 cents. It must be realized that the subsidies, which serve as a profit limitation, at the same time guarantee a producer approximately the same price per ton milled regardless of the grade of ore, and therefore do not encourage the fullest and most effective operation of the United States lead mines.

I cannot fully agree with the interpretation given by many that the estimates of ore reserves of the Bureau of Mines indicate that the United States is a "have-not" nation. I do agree, however, that under the Premium Price Plan, insufficient margin for development work has been given, and that therefore the known ore reserves in this country present a depressing picture, but I feel sure that there must be great ore reserves in this country which have not outcropped and which will be found provided sufficient funds are available for exploration and development, and the outlook for a profit in mining is attractive to risk capital. Until such reserves are found, we probably cannot count on a mine production of much more than 400,000 tons per year for our million ton requirement.

Assuming that the mines will produce 400,000 tons per year, and the 300,000 may still be obtained from scrap, we must import 300,000 tons if we are to cover our requirements of one million tons. Last April I was very much upset upon learning that our government had made an agreement with England to import only 137,000 tons in 1946, even though 350,000 tons were imported in 1945. Actually, the imports to date have only been around 8,000 tons per month, or at the rate of about 100,000 tons per year.

To conclude, and in order to eliminate criticism for not recommending a constructive procedure to aid the present lead shortage, I offer the following suggestions:

1. Immediately decontrol lead and let free market conditions prevail even though for a time this may result in a materially high price. If this is done, the industries which need lead will obtain it, and the other industries which do not need lead as greatly will be forced by economic necessities to find substitutes.
2. If decontrol immediately is not possible, because of the difficulty of decontrolling the industries which use lead, then I would suggest we raise and maintain the ceiling price on lead at approximately the world market. If the world price is not sufficient to maintain the production required for the domestic economy as well as the military necessities, then adjust the Premium Price Plan so that in effect a uniform bonus per pound of lead produced would be paid to those marginal districts that require it, rather than a subsidy per rock ton milled, which is virtually a "cost plus" contract. Although the uniform bonus might vary as to districts, it should not vary as to producers within a district.

It is hoped that my offering of these two suggestions will be received in the same spirit in which I have made them, and that they may serve as a foundation upon which we in the lead industry—producers, consumers and government—can work together and I certainly hope that we will work together, and once more establish a sound basis for lead within the national economy of the United States.

ZINC

By **O. W. Bilharz**
Manager
Bilharz Mining Co.

By **Walter C. Page**
Asst. to Vice Pres.
and Gen. Mgr.
U. S. Smelting, Refining & Mining Co.

O. W. BILHARZ

IT can be said without equivocation that our domestic zinc industry was established and developed under the protective influence of an adequate tariff policy. As early as 1792, zinc was first connected with tariffs when "Lapis Calaminaris" or calamine was specifically mentioned. Thereafter, the various tariff acts from 1842 to 1930 applied either specific duty rates of from 1 to 1½ cents per pound or general advalorum taxes of from 10 to 20 per cent. Throughout this period and up to 1935 the United States zinc market was the world market. Tariff protection was therefore only partially utilized because we dominated world production of zinc and competed in world markets with exportable surplusses.

Our Government policy in the recent past has been to reduce tariffs. The Reciprocal Trade Treaty policy is established. We in the Tri-State, as well as other marginal producers, now see no possibility of building a mining economy on a basis of tariff assistance. We firmly believe that the State Department, having jurisdiction of the Trade Treaty program, should not leave the industry in a state of uncertainty and indecision as to what tariff rates we may wake up and find most any morning. The State Department should fix a definite floor to the tariff on zinc so that we can build a program for the future upon an established and firm basis so far as tariff rates are concerned.

In order to increase production to meet the rapidly expanding war-time economy, the Premium Price Plan was set up to establish price levels that would make possible the mining of marginal ores not minable at current prices, maintain current high-cost production and stimulate additional production through the fullest use of existing facilities. Operation of the plan was rapidly focused on the Tri-State area because large reserves of zinc were readily available there, the concentrates of which were very high grade and easily smelted and, because the area's reserves of profitable grade were rapidly being exhausted, the broad application of the plan could bring immediate results, production-wise, from the large reserves of available low-grade ores not otherwise economical.

Under the Premium Price Plan the

Tri-State has made an enviable record during the war period and under the extension of the plan is making an enviable peace-time record now. In spite of the depletion of the better grades of ore, the discouraging shortages of needed materials and manpower and the ever-present prospect of the end of price control voiding any future plans of continued development, the Tri-State is proceeding with the extraction of every possible ton of ore by careful extension of present deposits, improved extractive techniques and advances in beneficiation.

Recently the Stockpile Act became law. It relates to the acquisition of stocks of strategic and critical materials for national defense. It is the stated purpose and intent of the act not only to provide for the acquisition and retention of stocks, but to encourage the conservation and development of sources of these materials.

Our country is wisely and properly committed to a policy of conservation of natural resources. It follows inevitably from that policy that a program such as the Premium Price Plan must be continued. Without it our basic policy simply cannot be carried out.

That we can conserve our ores in the ground is theoretically true; actually, it is false. The zinc and lead mining industries require much technical knowledge and skilled labor. If we permit a healthy mining industry to be dissipated, long months and perhaps years will go by before it can be reassembled even in part and on an inferior basis, and if we want to have zinc as a safeguard against possible future emergencies we cannot permit this to be done. Of course, the cost of reassembling such technical knowledge and labor would be enormous. But even if it could all be done, many reserves would be lost. The cave-ins and flooding of mines that would result would in many instances make it impossible, at any cost, to recover the ores.

Perhaps the greatest loss would be the failure to discover new ore bodies. A country such as ours is certain to be rich in ore bodies even after the high-grade ores have been exhausted. It not only takes money and an incentive, but above all it takes time to discover and develop these ore bodies. Again, if we wish wisely to prevent the next emergency by being prepared for it, we cannot expect to begin looking for our ores at the time of crisis.

We of the Tri-State again restate that no nation has such a superabundance of minerals that it can afford to waste them. To preserve these and other reserves of similar nature, we recommend in conclusion:

1. That the Premium Price Plan be established *permanently*, based upon an open or free market as provided in the Senate McFarland and the House Bunker Bills, premium payments being made to submarginal producers over and above the monthly average metal market as published in the *Engineering & Mining Journal*.

2. That disbursements under the plan be placed under the jurisdiction of RFC, and all policy matters with the Secretary of the Interior, who shall appoint a director of the plan who shall coordinate the operations of the plan with the activities of the Geological Survey, Bureau of Mines, and in cooperation with the authorities who will administer the Stockpile Act.

By W. C. PAGE

THIS convention of the Western Division of the American Mining Congress, the first since 1941, reminds me very forceably of that last meeting held in San Francisco just five years ago. I attended that meeting as a private, unemployed citizen.

You may well believe that I firmly thought, after spending that time during which I was fortunate to personally observe conditions in practically all of the Balkan and other eastern European countries and finally the German-occupied Yugoslavia, that I had just about seen everything related to economic controls. Those controls were, of course, to a large extent brought about by the war which started in 1939 but in many cases had been initiated to an extent earlier because of the shortage of exchange credits. We experienced rationing of sugar, flour and butter and controlled prices on those commodities as well as metals. Lead and zinc concentrates which we produced were used by the Yugoslav government in barter dealings with neighboring countries as payment for flour and high octane gasoline. I felt that I was fortunate when I was asked by the pre-war Yugoslav government to personally enter into these negotiations. I was asked to do this from 1939 until war came, as a citizen of a neutral country. In this way I learned intimately the theories, practices and effects of European-planned economy, particularly as regards metal dealings. The people in small business, as well as peasants, strongly resisted but were submerged under the new order. They could do nothing else.

To go further, after that meeting in San Francisco I was influenced, through contact of my old friend, Frank Ayer, to go to work in Washington with him in the Copper-Zinc Division of OPM. That was about November 1, 1941.

Discussions between the various agencies commenced on plans vague and incomplete but all pointing directly to controlled economy in metals production. During those discussions I believe, without exception that everyone in the copper, lead and zinc organizations in WPB strongly resisted any such plans and argued and fought for the continuation of a free market. Most of these individuals have since departed from Government service for one reason or another.

The ultimate result, as you all know, was that the Premium Price Plan was initiated as of February 1, 1942. I presume that Frank Ayer thought that my European experience would be valuable in helping to constructively administer such a plan as he appointed me the zinc member of the Quota Committee. I do not propose to review or to make any statement as to the procedures, policies, arguments or what might be called the "goings on" in that committee from the time of its original organization until I left Washington in late April of 1943. As a member of the Quota Committee it was necessary that I carry out policies, some of which were contrary to my ideas. I carried out all policies as outlined as I felt that the need to do so was created by the war emergency.

Since leaving Washington I have had an opportunity to view those metal policies in retrospect and currently and while I agree that the Premium Price Plan accomplished its purpose in the war period in gaining production from marginal and submarginal mines, I am of the opinion that the mining industry as a whole would have preferred and could have devised a more practical plan. I have always felt that the Premium Price Plan was perhaps inequitable and impractical in that it does not sufficiently give incentive for efficiency in operation. I have often heard it said that the Premium Price Plan placed a premium on inefficiency. This, however, is water over the dam but it gives me this thought. We have all sensed a gradual but increasing tendency on the part of practically all producing industries, that have tasted of subsidies and other governmental relief, to relinquish initiative and self-determination. There appears everywhere to be an increasing tendency to look to Washington for financial assistance and the solution of problems by "directives" rather than for industry to depend upon its own ability and resourcefulness as in pre-war years. In brief, I feel that the inherent sense of free enterprise is becoming dulled through complacency and appeasement just as was so evident to me among the people in Europe. I feel so strongly that the continued trend of metal controls in the United States so closely parallels in theory and application that which I had the experience of observing in Europe, that I cannot help but be concerned as to the future.

We have the Premium Price Plan with us until June 30, 1947, and my message is that the metal mining industry has ten months in which to make up its mind whether it wishes to continue production under that plan or will it, as of July 1, 1947, demand a return to free markets and free enterprise.

QUICKSILVER

By S. H. Williston
Vice President
Horse Heaven Mines, Inc.

QUICKSILVER has been the guinea pig of the metal industry for the last five years, and whatever happens to quicksilver usually happens to somebody else within the industry in a very short time.

At the present time the consumption of quicksilver is approximately 25,000 flasks a year. The imports during the first six months of this year and the expected imports for the remaining five months, including the material afloat and in customs in New York, is one year's supply. The stockpile in the hands of the Government is now over the stockpile minimum. The tariff of $19 a flask which has been in effect since 1922, is subject to the same danger of reduction under the Trade Agreements program as are other commodities.

Now, if we look at the cost of production and the production figures of the mines in operation, we find a sad picture. Based on labor cost, in other words, the amount of labor a flask of quicksilver will buy, the current price of quicksilver is the lowest in history. The production naturally is falling. The mines in operation, which consisted of some 30 or 40 before the war, rose to 190 during the war and are now down to six. Now, how did we get that way?

During the war the domestic quick-

silver industry produced all the metallic quicksilver needed by the allies in the war effort. The War Production Board overestimated the requirements in the early years of the war. They were worried about the supply of quicksilver, and they imported from abroad tremendous amounts at prices higher than they paid the domestic industry. When the war was over they had an excess of some 100 to 150 thousand flasks, more than enough to fill a stockpile.

Quicksilver imported from Spain, which through a stenographic error was twice as much as they intended to order, cost the American Government $280 a flask counting the duty. Quicksilver imported from Mexico was on the same basis and the combination of a glut of quicksilver during the war period and the flood of quicksilver which has since come in from the European cartel, has gotten us in our present situation.

We now have a condition where the United States is saturated. It is going to be saturated for a year. The current cost of operation of the quicksilver mines is a 1946 cost of operation. The current selling price of the article is a 1937 price. The number of mines that can survive under those conditions is few. We are half as well off as we were in 1932.

Now, what does this mean from the point of view of economic security? When the war ended last July statements were made that we were a have-not nation in quicksilver. The dope on which those conclusions were based was three years old. Among other things it failed to take into account new ore bodies discovered at the principal producing mine in the United States, which has been in operation for two years, and the second principal mine which has been in operation for three years.

Based on present war costs and based on present war prices, the quicksilver industry has the largest reserves that it has had since 1865. It had a six-year reserve of proven ore. The increasing costs, the decreasing price, the influx of foreign metal encouraged by Washington, have turned a six-year supply of present war ore into almost nothing. Unless something is done—and I am quite confident that nothing will be done—the quicksilver industry, which has been in operation ever since California became a part of the Union or a little farther—1845, a little over a hundred years—will die. I see no alternative unless the Army-Navy Munitions Board in its desire for security finds some means of preserving that industry.

TUNGSTEN

By **Blair Burwell**, Vice Pres.,
U. S. Vanadium Corp.

SINCE 1922, the American tungsten industry has existed and slowly developed under tariff protection in spite of many adverse factors. In this period between World War I and World War II, it cannot be said that the industry was particularly prosperous. But it did live and it did develop. The production of American mines was roughly 10 per cent of world production.

Under this somewhat vigorous existence, the development of processes to increase recovery from ores was a necessity for existence. While American industry in tungsten produced 10 per cent of the world's metal it produced nearly all of the world supply of metallurgical "know how"! The submarginal deposits at the end of World War I became the important resources of World War II.

This was entirely due to tariff protection.

In the critical war years of 1943, 1944 and 1945, the American tungsten mines as a result produced approximately one-half of this country's war needs which included the war needs of allied nations. The 26 million pounds of a total of 53 million pounds of tungsten metal thus produced speaks more eloquently than I of the strategic value to this country of wisely administered tariff policies.

Tungsten, as a strategic metal in war requires no elaboration to this audience. It is my understanding that the stockpiling of tungsten is an essential part of the stockpile program and in this the American producer heartily agrees.

We believe that the stockpile requirements for tungsten should be filled if possible from foreign ores. Much of the foreign production is coming from surface deposits or shallow mines in a harvest of cheap tungsten.

The tungsten supply of the world in the future will most probably depend upon deep mining and the treatment of complex ores at higher cost. The purchase of foreign tungsten under present conditions for a stockpile is both good business and good statesmanship.

As to the resources of American tungsten deposits. They are extensive and yet unmeasurable. Our known resources at the end of World War II are greater than the known deposits at the end of World War I.

But our resources of tungsten depend upon the existence of a going industry with the knowledge to continue the development of low-grade ores. Without the tariff, American mining cannot continue to survive, as the price of tungsten is controlled by the price of foreign ores.

I would like to say a few brief words about the future of tungsten. It has, of all the alloy metals, possibly the brightest promise in serving the engineering world of tomorrow.

ANTIMONY

By **James P. Bradley, Vice Pres.,**
Bradley Mining Co.

DESPITE the fact that the use and delivery of antimony has been strictly curtailed during the war and also since the cessation of hostilities, antimony stocks in this country began a decline in 1943 and are still declining. A deficit in the supply of new antimony is expected to continue through 1946.

Imports this year have fallen off considerably due to the depletion of Government stocks of Bolivian ore (purchased in 1943 and stored in Chile until 1945) and also due to strong competition for available foreign production from other countries. There is a particularly strong demand in European countries which were deprived of antimony during the war.

China, Bolivia and Mexico have normally been the chief sources of supply. In the past Bolivia and Mexico have supplied the bulk of our imports and the Chinese production has mostly gone to the European market (see Table III). Due to disruption of Chinese mining activities as well as water and rail transportation during the Japanese and civil wars, it may take some time for China to regain its former important position as an antimony exporter.

According to the Civilian Production Administration, domestic requirements are increasing and will be much greater in the pre-war years and may be even as great as during the last two war years when the consumption was approximately 46,000 tons annually.

Recovery from scrap (mainly old battery plates) has been the most important domestic source of antimony and until the Yellow Pine Mine in Idaho came into production, the domestic mine production was a negligible factor. The Yellow Pine mill was shut down during the first quarter of this year for reconversion to a large tonnage basis, but is now in operation and it is probable that domestic mine production will account for about 13 per cent of the available supplies for 1946. The remainder will come from imports and scrap. Imports have normally furnished a slightly larger tonnage than scrap, but during the first quarter of 1946 this situation was reversed and scrap became the largest source of our antimony supplies.

The metallic uses for antimony are about the same in war as in peace time, namely antimonial lead, bearings, batteries, type metal, etc. Comparatively little antimony is used in ammunition either in war or in peace.

During the latter years of the war a large use developed for antimony oxide for flame-proofing of textiles (tents, gun covers, etc.) and for use in fire-retardant paints. It is possible that some of the early losses of airplane carriers and other warships could have been prevented if they had been painted with fire-retardant paints. Last year 7,675 tons of antimony went into the flame-proofing of textiles. New plants had been built to produce antimony oxide and were barely in operation before the war ended in August and the oxide contracts cancelled. The oxide situation was considered so urgent during the war that practically the entire Government stockpile of antimony metal was converted to oxide. This caused a surplus of oxide and insufficient metal after V-J Day.

The consumption of antimony for non-metallic products dropped very sharply during the first quarter of 1946 whereas the consumption for metallic products continued at a slightly higher rate. The non-metallic demand has picked up since then as the price of antimony oxide was increased early in July one cent per pound to 17 cents per pound.

The domestic price of metallic antimony is still at the OPA ceiling of 14½c per pound, f.o.b. Laredo, Tex., as compared with a price of 22.46c per pound in England.

Due to the fact that there is no tariff on antimony ore and concentrates and a tariff of only 2c per pound on the metal and with the price ceiling far below the world price, there has not been much to encourage the expansion of the domestic antimony mining and smelting industry. It is my understanding that premiums or subsidies have been paid to some domestic smelters and some foreign producers, but not to domestic miners.

TUESDAY MORNING

Mechanization for Greater Productivity

MECHANIZATION OF OPERATIONS IN POTASH MINING

By G. T. Harley, Mgr., International Minerals and Chemical Corp.

THE chronicle of the development of mechanized operations in the potash mines at Carlsbad, N. Mex., is, indeed an interesting one, and for several reasons: Fifteen years ago when the first mining operations started, strictly hand-mining methods were used, and in this relatively short period of time through the concerted efforts of the three companies now in the field, the present high degree of mechanization has been reached. The practices developed at Carlsbad have served as models for the development of other bedded deposits in the non-metallic field, and some of the methods in current use may find partial application in the field of metal mining in bedded deposits that are flat lying or gently inclined.

The main potash deposits of the region, those containing sylvite, lie at a depth of 1,000 ft. below the surface, and are overlain and underlain by salt. From the surface to the top of the salt there is 400 to 500 ft. of beds of permian age, consisting of red shales and sands, interbedded with anydrite, gypsum, and limestone.

The first mining in the district was by United States Potash Company in February, 1931, after preliminary core drilling and shaft sinking had been completed. Production was at the rate of 200 tons per day, and the ores were trucked to Carlsbad and shipped as manure salt. Methods used were those common in metal mining practice, with the use of wet jackhammers, hand mucking from a rough bottom and hand tramming.

International Minerals and Chemical Corporation started its underground development campaign in May, 1940, after having completed its shaft bottom work with the use of a Goodman type G-20 Shaker Conveyor with duck bill. Development headings were driven with a Joy 11 BU Tractor Loader, loading into solid-bottom cars of 5.5 tons capacity. Track was laid with 42-in. gauge, 60-lb. rail in main entries, and 40-lb. rail at faces and later in rooms. The second Joy Loader in the district was installed on the Langbeinite (800) level, and was serviced by two Joy 42E shuttle cars which operated on a double overhead trolley system, and on cable reel when ahead of the trolley.

Potash is mined in the same general manner as coal, but with a quite different technique. In blasting coal it is difficult to keep a maximum lump content and a minimum of fines in the pile. Potash is compressible or resilient and tends to break into large boulders that are difficult to handle. Because of its properties, potash, even though undercut the same as coal, requires closer drilling and higher charges of explosives to secure satisfactory breakage.

Throughout the district the room and pillar system of mining is in use. Pillars vary in size from 32 by 41 ft. at International and United States Potash Company to a maximum of 40 by 60 in other sections. Rooms and break-throughs vary from 24 ft. to 36 ft. in width and two, three or four parallel entries are driven which vary in width from 16 ft. in waste to 20, 24, 32 or 36 ft. in ore, and depending on whether track loading machines or trackless machines are used. The wider ones were trackless machines; the limited width with the track-type of machine.

The daily production of crude ore in the district is something over 12,000 tons of which International is currently producing 4,700 tons.

All mines are completely electrified. Main cables into the mine and along main entries carry 2,300 volts. Portable air-cooled transformers are used on each section, mounted on skids with all accessory equipment attached. It takes only a little over an hour to disconnect one of these transformers, and set it up again in a new section of the mine. Power to all mining equipment is 220 volts, 3-phase, 60 cycles, fed through secondary cables from the transformer to junction boxes maintained within 75 to 100 ft. of the working faces.

The haulage system operates on 250-volt direct current, and motor generator sets are installed at intervals underground to preserve the efficiency of the system over long distances. In all probability future units added on this line will be mercury arc rectifiers at International.

All faces are undercut to a depth of 9 ft. If the seam is of sufficient height to clear the loading equipment, the cut is made in the ore; if only a few additional inches are needed, the cut is made in salt. Where the bed is quite thin, the ore may be mined out, and from one to three feet or back shot down to provide head room for further work.

Machines are transported by rail-mounted trucks where track-loading machines are used and by caterpillar trucks in trackless areas. Each truck has mounted on it a small aerodyne midget fan for ventilation of the face, while undercutting and an essential part of the equipment carried is a hand auger drill for drilling the bolt holes in the floor.

Jeffrey A6 post-mounted electric auger drills, 220-volt, AC 3-phase are in general use in the district. Drilling speeds vary from 28 to 36 in. per minute and steel and bit wear is not excessive. Three lengths of steel serve to drill holes up to 11 ft. in depth. Generally, in the district, holes are drilled in the common toe-hole pattern in vertical rows 4 ft. apart, each row containing three, four, or five holes, depending on the height of the face; but at Potash Company of America, due to a low height of seam, a vertical V-cut round has been developed which involved fewer set-ups, but more holes drilled per set-up.

Blasting is done on graveyard shift at two of the mines, but at the end of each shift at International. Primers are made up underground and the shot firers or haulage crews haul powder and primers from the underground magazines to the faces in insulated cars equipped with insulated couplings. Holes are fired electrically and each round is connected in series. The shooting circuit is 220-volt AC and is taken off the transformer serving the section with power, but through a separate blasting line having locked switch boxes. Both duPont and Hercules powders are in use in the district.

At present three types of mechanical loaders are in use: The Sullivan three-drum track-mounted scraper loaders; the Jeffrey L400 and L600 track-mounted machines, and the Joy 11 BU A. C. and 14 BU D. C. caterpillar-mounted loaders.

At all the mines, trolley locomotives are used for main line haulage. At United States Potash Company 8-ton trolley-cable reel locomotives in tandem are used on main line haulage, and 8-ton trolley-cable locomotives on gathering service.

At Potash Company of America main line trolley locomotives weigh 15 tons, and for gathering service the 12-ton battery-trolley locomotive is in use.

At International, main line haulage is with 20-ton trolley locomotive with gathering locomotives of 13 tons weight.

At two mines, loaded mine cars are dumped at the shaft by a rotary dump; uncoupling of a train is not necessary because of swivel couplings on each car. At the third mine Granby type cars and dump are in use.

At Potash Company of America the 7 AU Sullivan track-mounted Universal machine has gotten beyond the development stage and has been used for undercutting, overcutting, and side cutting if required. This machine has an 11-ft. cutter bar, but due to the fact that no water can be used and therefore, there is little dissipation of heat, the cutting speed must be kept below 6 in. per minute. That is the overcut and side cut, the corresponding changes in the drill round. That is the vertical V-cut I described. If the 11-ft. cut is finally adopted, corresponding changes in drill rounds will be required. Three 10 RU Sullivan rubber-tired Universal cutting machines are also in use. Experiments have been conducted with home-made machines for the removal of bug dust. Experimental work is also being done with a track-type drill Jumbo capable of carrying two or four drills for use in development work.

At United States Potash Company the caterpillar bulldozer for use in grading, cleaning faces and ribs and for haulageway clean-up, has gone beyond the experimental stage and is an essential part of the equipment.

At International studies are being made of the application of belt haulage underground for main line hauls and for transverse systems in the panels. Because of the coarse breaking characteristics of the ore, it will probably be necessary to develop a portable elevator-grizzly-crusher unit, to be installed at the loading point on the belt, and designs for this unit have been submitted.

One real problem that will face us in the next few years is the removal of pillars from underground. To this end a study of underground disposal of tailings will be necessary, and the means of transporting them from surface and their packing in the workings. Already the technique of stacking mine waste using the Joy loader in reverse position has been worked out, and the next step is to find a way to pack refinery tailings over this waste to form a solid mass to the back. It is expected that the small amount of moisture in the tailings will cause the entire mass of fill to pack solid before adjacent pillars are removed.

— *Discussion* —

Dr. L. E. Young (*Consulting Engineer, Pittsburgh*) pointed out that methods used in the Carlsbad potash mine represent a consensus of agreement on the best equipment adopted for these conditions. He discussed the application of shuttle cars and indicated that the one reason this equipment was so efficient was that there is no track equipment available for disposing of waste underground. He also discussed improved ventilation and pointed out that this would speed up the mining cycle.

Mechanical Mucking at the Silver Summit Shaft of Polaris Mining Company

By George M. Grismer, Supt., Polaris Mining Co.

IN order to speed up shaft work, there was conceived, developed and patented a mechanical shaft mucker known as the Riddell Shaft Mucker. When plans were first made by Polaris Mining Company to deepen the Silver Summit Shaft an additional 1,500 ft. plus adequate depth for sump, L. E. Hanley, president and manager of Polaris Mining Company, investigated the possibility of adapting the Riddell Mucker to do the job. After a study of the contemplated work by J. Murray Riddell, and upon his recommendation, it was decided to use the machine on the job.

On February 1, 1946, sinking was begun and the machine was put into operation after the fourth blast. Two experienced operators arrived to assist in the installation and first operation of the mucker. Since the operation of the machine is very simple, additional operators were broken in, and within a few weeks there were men on each shift capable of competently handling the apparatus.

The general features of design of the Riddell Shaft Mucker, are: a carriage, a frame, and a clamshell bucket.

The carriage moves horizontally, in either direction, along the long axis of the shaft. The chassis is made of structural steel members which are fastened together by either bolts, rivets, or welding. At the four corners there are flanged wheels which engage the frame. The front two opposite wheels are keyed to a common connecting shaft on which there is also keyed a chain sprocket wheel. The back two wheels have separate stub shafts. Mounted on the carriage are three compressed air-driven motors, serving the clamshell bucket, one the digging line, and the other the hoisting line. Another, reversible geared, is the unit which actuates the movement of the carriage by means of chain drive and sprocket wheels. Two men ride the carriage for the operation of the clamshell.

When it is necessary to lower the frame and carriage to a new position, the following procedure is followed: First, the clamshell is placed on the bottom of the shaft. Then the carriage is placed and locked at the center of gravity of the combined carriage and frame. Four clevises, with wire rope and hook attachments, are then fastened to the frame at points near the four corners of the carriage; the hooks are then attached to the rim of the muck bucket which serves the center compartment of the shaft. The hoisting engineer is then signalled to "make taut" the hoisting rope and raise the apparatus just sufficient to turn the "U" shaped hangers half way around. Subsequently, the hoisting engineer is signalled to lower the frame and carriage to approximately one foot above the next working level, then the "U" shaped hangers are turned to their original position, and the frame and carriage lowered to the desired new working position. A 6-in. x 10-in. timber, 5 ft. in length is then placed across the tops of the "U" shaped hangers at both ends of the shaft. Chains are fastened and securely wedged over these timbers and around the end pieces of the shaft set. This is done to prevent the impact of blasting from lifting the frame, unhooking the hangers, and allowing the apparatus to fall to the bottom. Safety chains are used around the frame of the machine and end pieces of the shaft to prevent the machine from falling should a hanging rod break while the machine is in operation. The required time for changing positions is approximately 12 minutes.

A 250 hp. double-drum electric hoist with a rope speed of 800 ft. per minute is used. Because of the distance the muck must be hoisted, the mucking operations are slowed down. The time required at this time to muck out a bench round of about 30 buckets is three hours. The cycle of operations will be slower as greater depth is obtained.

Since beginning the work on February 1, 1,000 ft. of timbered shaft were completed to August 24, and small stations were cut on the 2,000 and 2,500 level. By maintaining progress at approximately the present rate, the shaft will be completed by December 1.

Working three shifts per day, during the month of July, with five men in the bottom, 35 sets, or 183.75 ft. of timbered shaft were completed. This set a new record in the Coeur d'Alene District.

From the standpoint of the men, mechanical mucking is as complete a success as it is from the standpoint of the company.

Discussion

J. Murray Riddell (*Head, Department of Mining Engineering, Michigan College of Mining and Technology*) stated that the mucking results that had been achieved at the Polaris were in line with the results obtained elsewhere in seven other shafts that had been mucked by the same apparatus. He pointed out that the largest shaft mechanically mucked today had a dimension of 12½ x 21 ft. 4 in. The materials that have been handled have varied from shales and slate to sandstone, limestone, dolomite and quartzite as well as heavy sulphides. He stated that much of this equipment is now becoming standardized to meet various operating conditions.

Mechanical Mucking in Inclines

By Cecil A. Fitch, Jr., Asst. Gen. Mgr., Chief Consolidated Mining Co.

SHORTLY before the war the Chief Consolidated Mining Co. was running an incline from the 900 level on the Apex Standard property. It was during this period that Sam Colovich, who was our foreman at that time, conceived the idea of using a standard Finlay mucking machine to take the place of hand-mucking, which was both expensive and slow.

At that time we were starting an incline which dipped, to begin with, about 12 degrees, and later steepened to a pitch of 23 degrees. This incline followed an ore shoot of lead zinc, and we were having little success in making any headway by hand-mucking.

As an experiment, we decided to try using a standard Eimco-Finlay Model 12B mucking machine to increase the tonnage. Our machine operators were very experienced, since the machine had been invented and developed in the Tintic District, and we were able to greatly increase production.

There were, however, several serious drawbacks to this operation. In the first place, the traction of the machine on the 12-lb. rail which we were using was not sufficient to support the weight of the operator on the stand along with a load of muck. Consequently a tall man was needed who could stand in one place and stretch forward when loading the bucket, and bend backward when emptying it. The mine car was held in place on the incline by the cable with which it was lowered by a tugger at the collar of the winze; so the mucker did not have to handle the weight of the car.

Secondly, the lighter machine which we were using had a tendency to tip forward as the load was being picked up, and this necessitated placing a heavy weight on the back of the machine.

The third and most serious drawback was the danger of the machine losing all traction, and slipping down to the face of the incline, then turning over. This happened one afternoon, and narrowly missed inflicting serious injury to two bosses who were inspecting the face. Shortly after this, King Sam, as he was called, came forth with his invention for positive control.

The positive control device for mucking machines in inclines is very simple, and has been little improved upon since it was invented. Essentially it consists of drums attached to the front wheels of the machine on which are wound cables attached to spikes driven in the ground in back of the machine. To throw the center of gravity back far enough the cables from the drums are run over idler pullies attached to the back axles, and the down pull on the cables is achieved by pushing a bar under the track, and over the cables approximately 6 ft. in back of the machine. Normally, during the course of mucking up around this bar has to be brought forward several times, but the spikes only have to be moved when the drums have run out of cable.

The only comparative costs available to the writer were those concerned with our own operations, but they should give an indication of the effectiveness of using mechanical mucking in inclines.

The incline, mentioned at the beginning of this paper was run, for the most part, on a dip of 23 degrees. The winze was untimbered, except for heavy track ties and ladders and the average size of the winze before stoping of ore began was 5 ft. by 7 ft. A three-man crew per shift was used.

During the first half of the month this winze was started hand mucking was used with the resulting costs:

Thirteen shifts worked—Total tons, 48.

Labor	$323.47	per ton	$6.739
Air power....	33.61	per ton	.70
Supplies	22.79	per ton	.475
	$379.87		$7.914

The second half of the month the mucking machine with winze attachment was used.

Thirteen shifts worked—Total tons, 201.

Labor	$779.73	per ton	$3.878
Air power ...	140.52	per ton	7.00
Supplies	95.45	per ton	4.75
Total	$1,015.70	per ton	$5.053

The next full month was spent in further sinking, and stoping at the same time.

Twenty-six shifts worked—Total tons, 624.

Labor	$1,275.36	per ton	$2.044
Air power ..	287.21	per ton	4.60
Supplies	206.22	per ton	3.30
Total	$1,768.79	per ton	$2.834

The obvious conclusion to be drawn is that mechanical mucking in inclines whether figured on a footage or per ton basis cuts the cost of the operation at least two-thirds over hand mucking. The individual factors involved in sinking a winze will dictate whether or not the positive control device is necessary. In our experience, using the smallest mucker, light rail, and the desire for maximum safety, we have found the device well worth the cost and trouble.

Developments in the Use of Shaker Conveyors in Connection with Mining by Block Caving

By **Robt. W. Thomas, Gen. Mgr.,**
Kennecott Copper Corp.,
Ray Mines Division

IN 1939 the Ray Mines Division of the Kennecott Copper Corporation made a study as to the possible savings in development costs by the machanical transportation of ore on the mining sill. At that time it was faced with the future mining of a considerable tonnage of ore which was not amenable to the block caving grizzly method then in use throughout the mine.

In early days of mining operations at Ray similar areas were mined by a so-called hand-tramming method—the ore was drawn into cars of approximately one-ton capacity and then trammed to a central raise outside of the area being mined. This method, aside from being inefficient, was economically unfeasible due to ever increasing labor costs. Thought was therefore given to mechanical transportation. Attention was first directed to slushing, a practice which had come into common use during the previous ten years and which was being used with a great deal of success in many mines. The character of the ground at Ray, however, was such that it would be impossible to maintain an extraction drift of sufficient height and width to permit of the economic use of slushers. It was also felt that slushing would not permit of a uniform draw which is so essential to satisfactory extraction, particularly in areas where the ground is soft and has a tendency to pack. Consideration was also given to belt conveyors, but this method was considered impractical in extraction drifts requiring a great deal of repairs.

Attention was eventually directed to coal mining where much progress had been made in the mechanical transportation of coal, and consideration was given to the use of shaker conveyors which were being extensively used in coal mine practice. It was finally decided to purchase one shaker unit for experimental purposes, and the order was placed in August, 1939. The unit was received in October and by the end of the year sufficient information had been obtained to warrant a block test. The mine now has 20 units, 16 of which are in continuous use, and has produced with the shakers a total tonnage somewhat in excess of 4,000,000 tons, and at the present time is producing by this method approximately three-quarters of a million tons per year.

There was no change in the mining method other than to reduce the size of the blocks to meet the limitations of the shaker units being used. At Ray the ore is developed in panels, each panel being mined by blocks. In the grizzly system a panel is approximately 200 ft. wide extending across the width of the ore body. Drawing blocks are usually 200 ft. by 225 ft. In the shaker areas the panels are 150 ft. wide and the blocks 150 ft. by 100 ft. In the grizzly sections the ore is drawn directly from the draw points onto a grizzly, and passes through the grizzly directly into a raise leading to the haulage drift below. In a shaker section the ore is drawn directly onto the pan which conveys it to a central dump connecting with the haulage level.

The shaker conveyor is probably more suitable to heavy ground conditions than other types of mechanical transportation. Broken posts and swelling ground in the sill which would handicap other means of mechanical transportation do not interfere with the operation of the pan unless conditions become extreme. When it is necessary to make repairs to a drift set a section of the pan is removed and the remainder of the drift on the dump side is still available for draw. In changing top lagging a platform is installed above the pan and this work accomplished without interfering with operations. The muck developed while changing the top lagging is caught on the platform and is then dropped onto the pan through an opening in the platform.

The following costs cover operation and maintenance of the shaker conveyors, and are based on an average of costs over the past three years:

	Cost per ton
Pans and liners	0.75c
Installation and operation	2.18c
Maintenance	4.27c
Power	.30c
Total	7.50c

As to actual production costs, it is felt that these would be of little interest as operating conditions in different mines, and even in different sections of the same mine, vary so greatly that actual costs, unless one is completely familiar with these varying conditions, mean little or nothing.

The Ray Mines is now planning an experimental panel in which the shakers will discharge onto a cross-belt conveyor instead of directly into raises. If this proves feasible, it will effect an increase in the difference of the development costs for the two methods, and will permit of mining by mechanical means ore bodies of greater thickness as well as some thinner ore bodies that cannot now be mined economically.

— *Discussion* —

Jack Still (*Mine Superintendent, Miami Copper Co.*) indicated that their conclusions supported those of Mr. Thomas as at Miami they have been doing a very similar type of job. Starting in 1940, Miami began experimental work to determine which type of mechanical equipment would be preferable and have tried out both shaker conveyors and scrapers. Their experience pointed out that the shaker moved the material a lot farther than the scraper did and that this additional capacity is needed in some cases. He felt, however, that shakers had to be designed for the job on hand and often there was need for heavier equipment than had been used previously. He also pointed out that the shaker will not handle material that is over 80 per cent moist. Mr. Still indicated that the choice between scrapers and shaker conveyors was based largely upon mining conditions and the type of muck that was being handled.

TUESDAY AFTERNOON

Federal Labor Legislation

What Is Needed in a Sound Code of Labor Law?

By **Hon. Wayne Morse,**
U. S. Senator from Oregon

I THINK that American employers appreciate the fact that collective bargaining and organized labor are here to stay, and that it is very much in the best interests of our country that American labor have the right to participate in collective bargaining and enjoy the rights guaranteed to it under the Wagner Act.

The first premise I want to lay down is that in this period of hysteria in the attitude of the public toward labor problems, we need to recognize that basic American freedoms is the freedom of the American worker to bargain collectively and to make use of economic force, is necessary, to advance his legitimate economic rights.

I do believe, however, that the labor code that will and should be passed is one which should recognize that the right to strike is a relative right and not an absolute right. We cannot maintain government by law and we cannot maintain representative government unless all parties recognize that the right to lock out or the right to strike is a relative right; it is not an absolute right that can be exercised by labor or employers against the public interest when in a given case the public interest has become paramount.

The second major premise that I want to lay down in this discussion is that when we are dealing with labor legislation, we must always be able to answer this question in connection with any specific proposal: What is the enforcement remedy provided for in the legislation? No piece of labor legislation is any better or can be any better than its enforcement remedy. You do not help the cause of representative government by law; you do not help the cause of representative government any by passing legislation containing enforcement remedies that cannot be effectuated.

I want to point out that if we are going to have a labor code passed by the 80th Congress, it ought to be a code which is developed an issue at a time. I think one of the serious mistakes in parliamentary strategy used in connection with the Case Bill was that the proponent of that bill presented to us a piece of hodgepodge legislation covering a variety of issues, with the result that the opponents of each issue concentrated their forces against the entire bill. I think strategi-

cally that was a great mistake. The chances, in my judgment, of getting a sound labor code passed by the Congress of the United States will be better if it is required that it be bottomed upon a carefully conducted Senate or House or joint Senate and House investigation of employer and union practices and policies.

I think it highly essential that we have an independent conciliation, mediation and arbitration board because it cannot be expected that American employers are going to have confidence in a conciliation and mediation service that is under the direction and domination of the Department of Labor. I want to say that I have a very high regard for the Conciliation Service of the Department of Labor, but I want to point out that from a psychological standpoint it cannot be expected that we can build through that service the type of procedure for the peaceful settlement of labor disputes so long as it is attached to the Department of Labor.

I like to draw a line of demarcation between so-called disputes that involve wages, hours and conditions of employment and disputes that involve purely, or for the most part, dominating legal issues and questions. In the former class of disputes, I am opposed to governmental control by way of legislation. I tell you employers in the room that you have much more to fear from a labor code that seeks to bring hours, wages and conditions of employment under legislative mandate than does American labor. They tell us now that what we need is more governmental dictation over labor relations in this country; I say not in the field of wages, hours and conditions of employment.

When we deal with disputes that affect the legal right of innocent parties and of the public, however, then I think there is a clear obligation of a representative government, if it is entitled to the name at all, to step in and say to the disputants: "Because your conduct is transgressing and destroying legal rights which any government deserving the name of government ought to protect, we step in with legislation to protect those rights."

I think the National Labor Relations Board is going to have to be considerably revised, its procedures changed in many respects, the Act itself amended, and new powers given to the Board; and as a first step, and for purposes of discussion, I would suggest that there be vested in the National Labor Relations Board by appropriate legislation the authority to decide jurisdictional disputes and the authority to compel the parties to those disputes to submit the disputes to the Board for determination.

I view with some alarm the tendency on the part of some employers to take the position that what we need is straitjacket legislation based upon governmental compulsion over labor, forgetting that those same principles of compulsion, once they become enacted into law, can be used as effectively and, in my judgment, more effectively against the employers. If labor leaders and employers really want to retain this system of private property, on which their standard of living, in my judgment, entirely depends, then they had better recognize that they must learn to get along with each other around a free collective bargaining table, and they must stop turning to Washington for relief in the settlement of these disputes. I think the Federal Government should stand in the background, offering voluntary services of an independent mediation, conciliation and arbitration board in the settlement of a given dispute when asked for such service by the parties. But I think it is a great mistake for us to allow the trend to continue in this country of having the Federal Government every time a labor dispute develops step in in almost a mandatory or compulsory capacity. It is up to you.

— *Discussion* —

R. H. Glover
Western General Counsel,
Anaconda Copper Mining Co.

D. A. Callahan
President
Callahan Consolidated Mines

C. R. Kuzell
Assistant General Manager
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Rolla Campbell
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Jean S. Breitenstein
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Colorado Mining Companies

R. H. Glover

THE enactment of the Wagner Act back in the early days of the New Deal (July 5, 1935) commenced a new era in our economic and political life. Regardless of our feelings on the matter, most of us now realize that the basic principles established by this law have been engrafting themselves upon our jurisprudence as settled propositions of labor law.

The Wagner Act was presented to a Congress, which in the depths of a depression was blindly grasping at any and all offers of social reform served to it by academic theorists, most of whom had either failed in or had never tasted the practical side of industrial operation.

Examining this legislation from an unbiased point of view we must concede that it established, for the first time in our labor law history, a badly needed social interest in labor organization. Beyond this it is deserving of no praise.

In the 11 years since its enactment, we can see what the act has accomplished. There has never been a time in American history when industrial peace was more distant. During the past year the entire Nation has been plagued by strikes which have prevented the public from obtaining the ordinary necessities of life, and this situation is growing even worse. I say that after having read the objectives of President Robinson of the International Union of Mine, Mill and Smelter Workers for his next bargaining sessions with you gentlemen.

Nowhere on the horizon can we find a scintilla of hope that collective bargaining, as we know it today, will attain peaceful relations between labor and industry. Only a glance at what has happened and what is now occurring impresses us with the fact that as long as labor organizations are permitted to wield their political and economic bludgeons without regard to the common welfare, the doors to social progress and industrial harmony will remain closed. It has become perfectly apparent that the National Labor Relations Act, instead of promoting industrial peace, has sponsored an economic warfare of such intensity that it threatens to destroy our national security and the American standard of living. Instead of providing the employer and employes with equal bargaining power, the act completely wipes out all of the employer's power to bargain and places him in the position of accepting the demands of the Union or the sanctions it may care to impose.

Following a detailed discussion of aggravated abuses carried out under the Wagner Act by unions in the Butte areas, Mr. Glover went on to say:

Recently a ray of hope shone through the cloudy skies. NLRB member Gerard D. Reilly was a New Deal appointee and came from the Labor Department but became so sick of the maladministration of the Wagner Act that he resigned. In departing he recommended that the act be amended to give employers the right to petition for bargaining where the union claims bargaining rights and threatens to strike without notice to the NLRB; to give employers the right to speak freely during union organizing campaigns; to clarify the status of supervisory employes; withdraw the protection of the act from unions which strike against objectives of the act and stop the practice of the NLRB sitting as prosecutor, judge and jury.

From my very trying experiences in the past year I would say that you should withdraw the right of representation from any union which breaches its contract. Unions should be made subject for suits for damages or breach of contract. Nine days of strike cost our company $400,000, and over half of it was for breach of contract.

D. A. Callahan

I WAS present at the birth of the Wagner Act in Washington. The American Mining Congress, acting for the whole mining industry, presented witnesses before the Senate Committee on Education and Labor representing the nonferrous metals, iron ore and coal. Only two members of the Committee on Education and Labor heard the major part of the testimony presented by employers of labor.

The Wagner Act violates one of the very first principles of judicial procedure. A complaint of a violation is made, a hearing is held, not before a court but before an examiner appointed by the National Labor Relations Board. The ex-

aminer is the judge. He is a creature of the Board. The Board's agents collect the evidence and present it. There is no jury. Hearsay evidence is admitted. You may take an appeal from the decision of the Board to the Circuit Court of Appeals but under the act the decision of the Board must be upheld, if there is any evidence in the record in support of that petition—whether hearsay, rumor or opinion. If there is anything in the record that supports in any way the final decision of the Board, the decision must be upheld. It is final and irrevocable. I believe it is the most unsound provision ever put in a piece of legislation devised to regulate relations between American citizens.

I agree that we must not act in a spirit of hysteria. We must act calmly, and we must try to restore to the employers of this country a right to be heard, a right to have legal evidence submitted for them or against them, a right to have a trial by those who are impartial, the right of appeal, and the right of not being faced in that appeal with a record of evidence that is hearsay and would not have been admitted in any court of law since the beginning.

I believe in true collective bargaining. Most employers have been and are now opposed to the type of collective bargaining which we now have. They want bargaining in which they have some chance and they want, when once a bargaining agreement has been arrived at, that the law makes certain such an agreement be lived up to by both parties to the bargain.

I want you to know that the Wagner Act was passed as a political expedient. It was passed in a spirit of hysteria. It had unquestioned merit, and the man, Senator Wagner, who introduced it, had learned through bitter experience some of the evils it was trying to correct. But it was conceived in a spirit of hysteria, political hysteria. And it robbed the employer of the rights we used to call constitutional and places arbitrary and dictatorial authority in the National Labor Relations Board.

C. R. KUZELL

I HAVE prepared this discussion, which includes a set of suggestions for a code of labor law, with the very able assistance of Frank J. Ryley, labor attorney for our company. In support of the program thus outlined we have also prepared a rather extensive brief of arguments on each point recommended.

A labor relations code should be enacted which is compatible with the American free enterprise system. The present policy is one which permits the monopolization of manpower by labor leaders, invites strikes by rendering the Government helpless in the face of strikes, and facilitates the plotting of those working either for a planned economy and Government management or for the complete disruption of our economy.

A change in the social order such as from free enterprise to national socialism should only be effectuated by the people of the United States, yet we have before us right now the startling situation that a single labor baron has established national socialism over a whole industry while the people and Congress stand by helpless to rectify the situation. Certainly it was not the intention of the people or of Congress to permit the operation of existing labor laws to so operate that labor barons could destroy the social order and substitute national socialism. Such an intolerable result makes it imperative that a code of labor relations be promptly developed to prevent such usurpation of the power of the people and of Congress.

In such a labor relations code provision should be made to modify the National Labor Relations Act, create a code of fair labor practices—positively stated, regulate unions, repeal "judicial legislation" creating "worktime," and establish a new department of employer-employe relations.

The program which we have prepared is as follows:

A. Modifications of National Labor Relations Act.

Such a labor relations code should include the National Labor Relations Act which has as its two stated objectives the establishment and protection of the right of employes to organize and to bargain collectively, but it should be modified to also protect the individual workers, employers, the public and the Government in those fields.

The National Labor Relations Act should be modified to:

1. Prohibit membership in a union as a condition of employment.

2. Require the establishment of bargaining units on a craft or group basis within a separate plant or shop.

3. Establish that supervisors, administrative and professional employes are a part of management and expressly excluded from unionization.

4. Declare as unfair labor practices and subject to the remedies of NLRA those tactics by unions of defaming, ridiculing, and accusing falsely an employer for the purpose of organizing employes, rallying employes to the union in labor disputes, and destroying the confidence of employes in the employer and management.

5. Permit the free communication of opinion and facts to employes by employers at all times including during organizing campaigns, negotiations and strikes.

6. Permit employers to petition for representation investigations.

7. Provide that courts may determine whether the National Labor Relations Board's findings of fact are based on such relevant evidence as a reasonable mind might accept as adequate to support the conclusion.

B. A Code of Fair Labor Practices.

The code of labor relations should follow the example of the vetoed Case Bill and contain positive rules and principles establishing a field of fair labor practices. This part of the code should provide that:

1. Both employer, employes and their representatives shall bargain in good faith with each other within the framework of proper collective bargaining subjects and practices.

2. Provisions infringing or impairing the functions of management and to make work are excluded as improper collective bargaining subjects.

3. Actions by union officials to disrupt bona fide negotiations are proscribed as improper bargaining practices.

4. Labor contracts should contain as a matter of policy a provision for final adjustments by compulsory arbitration of grievances involving interpretation or application of the contract.

5. In the interests of stabilized employer-employe relationship, definite rules of procedure governing modifications of labor contracts should be specifically set forth. Such rules should contain the following essential steps:

6. In the event of a strike, the right to peacefully picket is recognized but mass picketing, acts of violence, threats and intimidation in connection therewith are outlawed.

7. Unions and employes, as well as employers, are required to maintain their obligations under labor agreements.

8. Sympathy strikes, jurisdictional strikes, strikes to accomplish unlawful or illegitimate ends, secondary boycotts, strikes in violation of existing agreements and strikes unlawfully called are made unlawful.

Strikes should be used only as an economic weapon against an employer in a dispute between that employer and his employes and not as a political tool.

9. In order that the provisions of the code will be effective and not flaunted by the unions, the breach of any provision of the code by employer, unions, or employes is an unfair labor practice.

10. Unions are subject to suit as entities and in the district of any U. S. District Court in which the offense is committed.

11. It is unlawful for any employer to pay any money to a union or into any fund or trust operated by a union.

C. Regulation of Unions.

The code should contain provisions regulating unions in order to curb the uncontrolled power now exercised or exercisable for the special benefit of the unions and at the expense of the public. These provisions should be designed to accomplish the following objectives:

1. Outlawing the industry-wide strike by prohibiting a union or group of unions acting in concert from directly or indirectly interrupting by strikes or work stoppages more than 20 per cent of the production of that industry at the time of the start of the strikes or work stoppage.

2. Making it unlawful for a union to spend any money on behalf of a candidate, directly or indirectly, in any primary or general election or for any other political activity.

3. Democratizing unions by prescribing an election procedure at regular intervals for participating by the entire membership and by requiring full and complete audits of unions by certified public accountants at regular intervals and their publication.

4. Subjecting labor unions and labor union officers and agents to the anti-trust laws as are other associations and citizens.

D. Amendment of the Wage and Hour Law.

The Wage and Hour Law should be amended so as to repeal the "judicial legislation" creating "work time."

E. Establishment of a New Labor Relations Department.

Establish a new executive department; call it the Department of Employer-Employe Relations; charge it with the duty of being impartial and having the purpose of cultivating equitable industrial relations; transfer to it all divisions and bureaus of the Department of Labor and abolish the present Department of Labor.

I do wish to say that these conclusions are out of a long experience as a workman, union member, mining plant boss and superintendent active in the conduct of negotiations with representatives of labor unions of many types.

By Rolla D. Campbell,

I WISH to emphasize the necessity of protecting the integrity of management by amending the Wagner Act so as to assign all supervisors and repesentatives of management exclusively to the management side of the bargaining table, and of limiting the monopolistic power which unions have attained and which they are exercising. So far, Congress has not seriously considered subjecting unions to the anti-trust laws, but in my humble judgment that is the most important provision needed in a new labor code. The provisions of the Case Bill would have been very helpful but except with respect to supervisors they dealt with a list of excesses of unions without going to the root of the trouble. We have seen that orderly strikes conducted without violations of law can convert this nation into a helpless, cringing paralytic, powerless at home and abroad, and some means must be devised short of the abolition of strikes and of compulsory arbitration to prevent industry-wide strikes which cripple the nation.

By Jean S. Breitenstein,

I AGREE with Senator Morse that the American people should not expect to have their labor troubles solved by Federal legislation.

Much of our difficulty in the last few years could have been avoided if the Administration at Washington had not by statement, by implication, and by action encouraged the labor unions in their demands.

Senator Morse said that the administration of the Wagner Act was slanted to the advantage of labor. It seems a rather deep slant. Until there is some improved administration it doesn't make much difference what the law is. Without a fair and equitable administration any labor code is absolutely ineffective.

I agree with Senator Morse that wages, hours, and working conditions should not be made the subject of legislation, and that it is necessary to control jurisdictional strikes and secondary boycotts.

The Wagner Act should be amended to exclude supervisory employes; an employer should have the right to request an election, and to express his opinion on matters of labor organization in the plant; the law should recognize unfair labor practices on the part of unions as well as on the part of employers; there should be a cooling-off period before strikes with a penalty attached for violations.

I firmly believe, however, that legislation is not a cure-all for our present labor problems, most of which you will have to solve for yourself. All you can hope for is a law which is fair to each side and an Administration which is fair to each side.

WEDNESDAY MORNING

Labor and Manpower Problems

SELLING MINING TO THE MINER

By Whiting Wililams

Industrial Relations Consultant

Cleveland, Ohio

IN VIEW of the conferences that have been going on in Washington and the labor difficulties of our most basic industry of coal and metals, we should feel concern today over the report that out of every three miners that went off to war, only one has come back to resume his former job. What is the reason for this? Why is it that so poor a job has been done of selling mining to the miner today? I fear that too many employers follow only the first of four basic rules of salesmanship. This first rule is that you must study, and know, and respect your job—your mining know-how. The second rule is that you must know and study and respect your customer, in this case your employe. The third rule requires that you know and respect your customer some more. And the fourth rule is that you must respect and know and study your customer *still more!*

The only reason I am here is that I have been trying for the last 27 years to study this customer, this employe, by working and living alongside him, often sleeping with him two in a bed and six in a room, in the mines and steel plants of Great Britain, Germany, France, and Russia; I have taken great pains in trying to find out what makes the miner tick. I was astonished to discover, contrary to the public's understanding, that nowhere did I find pride of craft, such a feeling of job importance as is encountered in any coal or other mine. This sense of initiative, personal responsibility, and independence based upon his mastery of the job, characterizes the metal miner even more than it does the coal miner. I have heard more talk and seen more demonstration of job pride in terms of individual craftsmanship in mining than I have ever heard or seen in the average factory worker.

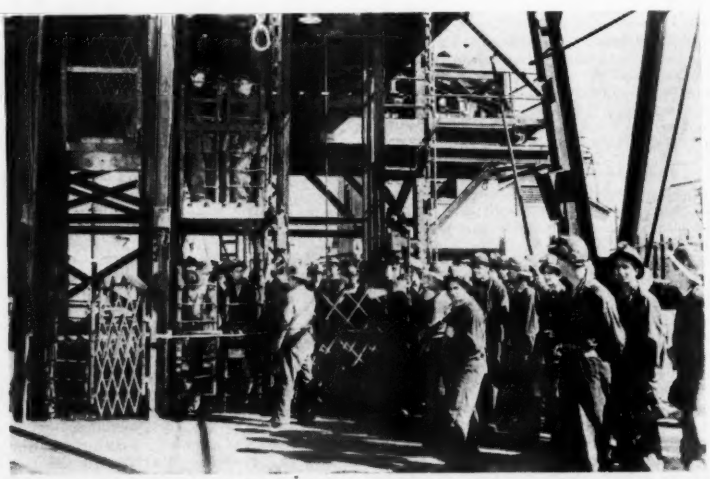
So it is very natural that supersalesman John L. Lewis joins other supersalesmen like Reid Robinson in utilizing their followers' pride of craftsmanship. Very often the employer has not done this. John L. Lewis uses excellent strategy and his methods indicate that he knows the miner, the Joes, the Jims and the Johns.

I wish to talk a few moments about three different tools which must be used if mining is to be sold to the miner by employers who understand the mental setup which he brings to his job. If I were to put on the desk of every executive the one rule I would like him to follow every day, it would be a small plaque reading, "Explain, explain, explain. If you can't explain, explain why you can't explain." The second tool would be called commendation. It is important that the worker receive a pat on the back for work that is well done. Of course this cannot be done promiscuously as the surest way to lose the respect of a craftsman is to pay him a compliment for a job that he knows is poor.

The third tool is this—close personal contact with your individual miner. I think it must be said that our American engineering schools were long deficient in this regard. I recall one engineering school where students told me recently they had made a request of the dean of the school for a course in human relations and psychology. The dean of the school said, "Nonsense, we won't bother with that." So, on their own initiative the boys organized a club for discussion of the psychological angles of the engineer's job. Only through personal contact can employers learn what the little irritations are that interfere with efficiency. You get closer to the heart of the situation if you realize what every union leader knows: That he remains a leader only so long as he follows the wishes and the pressure of his members. If you will try to lessen the pressure the men exert on him, he will probably ease up the pressure being put upon you.

Today we are also thinking too much of merely winning victories over the union. You may win a victory with the help of your lawyers by going to court, but you cannot win friends among your workers by any other means than by close understanding and personal contact. One reason why the CIO has made its surprising growth is that it showed to the Johns, Joes and Jims in mine, mill and factory, deeper concern about their problems than did their employer.

Men are essentially interested in recognition. We dislike the man who makes it difficult for us to believe in ourselves. We hate the guts of the boss who hogs all the credit for accomplishment and gives us no recognition at all. Miners are only human and will be glad to give their utmost if they can receive the recognition due to them.



Adequate manpower continues to be one of the industry's principal problems

Incentive Wage Plans for Greater Efficiency

Round-Table Discussion by

W. H. H. Cranmer
President
New Park Mining Co.

A. H. Bebee
Vice President
Golden Cycle Corp.

S. S. Clarke
Gen. Supt. of Mines
Eagle Picher Mng. & Smelting Co.

S. H. Williston
Vice President
Horse Heaven Mines, Inc.

F. O. Davis
Treasurer
Potash Company of America

W. H. H. Cranmer

THE key to the outlook for business in the immediate future is the willingness of labor to produce efficiently. The spiral of higher wages, higher prices, will not end until individual output per man-hour rises to offset wage increases. Wage increases without increased production must bring higher prices.

If we want more prosperity and a higher standard of living we must produce more as individuals.

By installing incentive pay plans based upon individual unit or piece work rewards similar to the regular miners' contract and, extended so far as possible to include all the employes, we can release the banked-up vital power of employes, increase production, lower costs and raise the real wages of employes. This is not an untried theory. The New Park Mining Company has been working to perfect such a system. And, while there are difficulties in making an incentive plan fit the many and varied conditions of our mining operations, we have made considerable progress.

It is most important that the workers be made to realize that management approaches the problem with sympathetic understanding of their problems and a sincere desire to extend to the workers the maximum reward possible consistent with the rights and obligations management owes to the public and the stockholders.

The plan to succeed should be acceptable to the Union and not be introduced against Union opposition. The plan must be equitable and practical and sold to the workers or it will soon fail. The worker should receive a handsome reward for his extra effort above the standard set for his regular pay; the company can benefit and production be greatly increased.

Incentive wage plans provide a flexible supplementary payment which fluctuates with production and income. They should, however, be but one factor in a well-rounded program of employe security benefits such as life and accident insurance, retirement benefits and savings plans.

The experience of the New Park Mining Company shows: First—Standards must be set up of the amount of units to be expected for the regular base pay. Second—The production above the standard for regular pay be apportioned on a percentage basis.

In the era we are entering old political and economic forces are disintegrating and new forces are taking their place. Even labor is beginning to realize the facts of life, and the president of the Utah Federation of Labor echoed this fact recently at the Federation's convention when he said *"Production is going to be the battle cry during the coming year."* If labor stops feather-bedding and arbitrarily limiting productivity, production will roll out in great volume. And, if management sees that each individual is rewarded in accordance with his contribution and given proper incentives, we will have prosperity and an ever higher standard of living.

There is no other way to accomplish these much-desired results.

A. H. Bebee

MANY of the mining companies in Cripple Creek carry on quite extensive operations through the split-check leasing system. There are several reasons for this: First, it attracts the best class of miners. Second, it discourages labor unrest. Third, it is the most efficient and cheapest way to mine the many small erratic ore bodies of the district.

Leasing attracts most of the best and able-bodied young miners, who would much rather gamble on a lease than work for a fixed amount per day. Some of them may not make wages, while others run into the thousands of dollars per year, but on the average, I would say that they do much better than the men who work for a day's pay. A lessor is a very independent sort of fellow and does not have to be pushed. He is compensated according to his labor and if he does not produce, he receives no compensation.

The theory of split-check leasing is that the lessee furnishes the labor and the company furnishes the supplies, such as powder, fuse, caps, drill steel, timber and other necessary supplies. The company does not, however, furnish machines, hoses, or small tools used around a machine. The lessee must furnish all labor, pay his own compensation, hospital fees, social security and other Federal taxes. This results in his having a greater understanding of the problems which face the mining industry today.

Leases are granted on blocks of ground about 200 ft. square, extending from one level to the next. Generally two men will go in on a lease on a partnership agreement and we always try to see that at least two men are in on every lease in order to have as many men as possible on the blocks of ground that are leased out.

Each lessee's ore is kept separately and dumped into separate bins on top where the lessee does any necessary sorting or preparation of the ore. The ore is held until the lessee has a carload and it is then shipped to the Golden Cycle Mill in Colorado Springs.

The company receives a royalty of 50 per cent of the net mill returns. In addition, the company receives 1 per cent of the gross value of the ore. This 1 per cent is supposed to cover the lessee's portion of taxes. The lessee receives the difference as his share. Roughly he receives a little under 49 per cent of the net mill returns.

Leases are granted for a six months period, but are automatically extended an additional six months provided the lessee's work is satisfactory to the company.

Lessees must perform at least 50 underground shifts per month on each block of ground. Failure to perform 50 shifts per month is grounds for forfeiture of the lease.

We carry on company operations and leasing through the same shafts in Cripple Creek. The portions of the mine which the company does not wish to work on company account, are blocked out and turned over to lessors. We have absolutely no trouble in carrying on both operations through the same shafts at the same time, as all ore is hoisted separately and placed in individual bins.

You can readily see why lessors do not easily fall for any sort of labor agitation. In fact, most of them are dead against this sort of thing, as they are employers or potential employers themselves.

S. S. Clarke

THE writer has never been in full accord with the policy of a standard wage scale for production workers, basing his belief that such practice would lower the output of the capable worker to match the efforts of the below average worker, or if the capable miner could not adapt himself to a slower tempo, he would produce enough to help hold the inferior worker's job and no doubt cause some discord in the crew.

The basic wage policy and the antagonism of some people toward production bonus pay, tends to penalize the skill, resourcefulness and ingenuity of the aggressive type of worker. On the other

side, the policy of some managers in the administration of bonus pay has rightfully caused loss of confidence and distrust on the part of employes and given critics just cause for their attitude.

Then again management is guilty of a breach of good faith, that is when some individual or group through coordination of efforts and ability earns what the management thinks is too much and the bonus rate is cut, then you have dissatisfied workers who, as a rule, will just put out enough work to get by. In order for any bonus or incentive pay plan to be successful, it must be correctly established at the start as any changes in the rate particularly downward would destroy the confidence and good will.

When the bonus plan was being considered by this company, detailed records were kept of each mining heading. These records noted holes drilled, feet drilled, tons broken, powder used and personal data on the driller, the height of the ground was measured weekly and geological data noted.

These detailed records were kept for two years. The machine men who have been discharged for inefficiency during this period were not included in the final tabulation.

With such accurate data at hand, a fair daily production per drill was arrived at. That figure was called base and the incentive pay was set at so much a can (1,200 lbs.) or a ton over base.

It was thoroughly understood by the machine men that if the mining height was lowered, the base was lowered from 1½ to 3 tons per foot, so his earnings would not suffer as it is obvious that 10 ft. ground will yield more ore rock per round than 8 ft. ground. By the same token, if the mining height increased the base likewise increased.

By utilizing the production figures for such a long period of time in establishing bases, these figures proved to be so accurate and fair that only minor adjustments have been made and that due to physical changes in the formation.

The net results of the incentive pay is reflected in increased production. In four and one-half years, the tons per man have increased from 7.0 tons to 9.2 tons and we expect an ultimate rate of 10.0 tons average for all mines. The tons broken per drill shift has also increased from 46.6 tons to 68.7 tons.

In 1945, the high and low average daily bonus for drillers was from 28 cents to $3.13 with an average of $1.55. The higher figure represents some drillers using Jumbos and the drillers requested that the helpers be dispensed with. For the same period mechanical loading crew bonus had a low of 9 cents per day with a high of $2.09 with an average of 72 cents. The low was due to the nature of the ore lenses which does not allow much pay tonnage to be handled per unit.

The overall picture is a reduction in mining costs, increased pay for the efficient miners, cooperation and understanding between the crews and the supervising staff.

S. H. WILLISTON

OUR experience with the incentive wage plan has been brief. It has, however, clearly demonstrated some of the advantages and many of the drawbacks of such a system.

In the early part of the year we made a study of manpower output and arrived at a figure indicating the cost per cubic foot on the regular miners' rate, including straight time and overtime. We then put these same men on an incentive pay basis at the same cubic foot cost to us. The output of these same men doing the same job, in the same stope and with the same tools, increased by exactly 100 per cent.

When the miners in the district learned that a miner could earn this amount, there was an influx of good miners. These new men were able to earn on the incentive plan 64 per cent above regular wages.

Our experience with the incentive plan indicates the following advantages:

1. It is possible to freeze at the present level mining costs per ton.
2. It will attract to the operation many more competent miners than are otherwise available.

The disadvantages are:

1. The method freezes costs using the inefficient as a base.
2. If one mine in an area adopts the plan it drains off and increases the costs of the surrounding mines, forcing them also to adopt the incentive pay plan.
3. The large earnings of the incentive pay miners makes hoist engineers, skip tenders and all surface employes, including superintendents, dissatisfied, with a consequent demand for additional straight-time rates and consequent additional overall costs of operation.

Our trial of the method indicated that our regular miners were working at one-half of their best endeavor. Our trial also seems to indicate that the incentive pay plan is not a good long-term plan if there is any hope of ever reducing present excessive costs, and that it is a palliative for short periods only or for miners working under special conditions.

F. O. DAVIS

IT has been obvious in the press in the last several months that even the Unions and governmental officials are of the belief that only through productivity can additional pay be received by the men. There is only a certain dollar to be divided, and, if the men are going to get more pay for themselves, that has to come through additional work on their part in order to increase their take-home pay.

We in Carlsbad started an incentive pay plan some years ago, and it was done rather hastily. It was under war conditions. It is an over-all plan in which everyone is included and everyone participates. Further study would indicate that smaller units would be much more satisfactory. Of course, the ideal way would be to get down to individual performance, but that entails a lot of record-keeping, and probably the small groups of a similar type of work would be the most advantageous and best.

The disadvantage in our case, which is as true in many of the mining set-ups, is that if you pass on to the men the exact amount of unit pay that their output represents, it does freeze your labor cost. It doesn't give you the advantage of added remuneration to the company by virtue of more efficient operation.

That may change as conditions over the country change. It is an absolutely necessary part of any bonus plan to have some provision which permits the change of a bonus base when additional equipment is installed or when very radical changes are made in process work whereby the additional output is attributable to the management rather than to the men. But it has been our experience down in Carlsbad, and it has been the experience of several other operators I have talked to—regardless of the reason for the increased productivity the men or their representatives, the Unions, insist that the bonus base be not reduced.

There is one other factor certainly basic in all bonus plans, and that is that we cannot take the performance as of days like today, for example, as a measure on which to set one up. It is necessary to go back to a time when we had what was known as a normal output for a man and choose that as a base.

The second thing that is basic in a bonus plan is that it should be set up where the man can get something for it. Basically, we are going to have to expect out of the workman a certain amount of work for a basic day's wage, and the only way that we can do that is through some set basis of pay.

Montana Association Meets

(*Continued from page* 42)

ernment recognition of the industry's needs and for changes in policies of taxation, location and patent requirements for mining claims, securities registration, etc., together with adequate metal prices to encourage exploration and development. "The real fear of the prospector," Mr. Easton said, "is that if he does find a new ore body, he will be deprived of the fruits of his labor."

A discussion of "The Value of Your Mining Association" was led by Donald A. Callahan, vice president of the American Mining Congress. Mr. Callahan emphasized that all natural resource industry associations must work continuously to "restore private industry to its rightful place; to get the Government out of business, made necessary by the war; to restore free markets; and to oppose propaganda to 'nationalize' the natural resource industries of this country." Others participating in this discussion were John D. Bradley, president, and Harry W. Marsh, secretary of the Idaho Mining Association, and officials of the various district mining associations affiliated with the Mining Association of Montana.

Guest speaker at the concluding banquet was Honorable Abe Murdock, Senator from Utah, who gave a stirring address on silver, its importance to the economy of the West, its value in monetary systems, and its growing use as an industrial metal.

WEDNESDAY MORNING

Advances in Mining Practice

Diesel Haulage in Underground Mines—Trucks

By S. S. Clarke
Genl. Supt. of Mines
Eagle-Picher Mng. & Smelting Co.

THERE has been so much interest shown in our application of Diesel-powered trucks for underground haulage and in our method of detoxification of the exhaust gases to reduce the health hazard to a permissible content of CO in the mine air, that we hoped to have offered some operating data and other information before now.

Owing to a delay in submitting our application for a patent, and the fact that the United States Bureau of Mines is making some additional tests that are in more detail and under more variable load conditions than is possible to obtain in the mine, it was thought best to withhold any publicized data for a short time. It is hoped that with the additional information, the Bureau will be able to establish a code regulating the use of Diesels underground.

The states of Kansas and Oklahoma are following the operations very closely, and as a result of check sampling and observation, the Kansas authorities have granted permission for the use of Diesels in the Paxson Mine, and have requested that we convert to Diesels 100 per cent as soon as possible. In Oklahoma, it will be necessary to amend the mining law which specifically bans the use of any internal combustion engine in a mine.

Underground tests are still continuing. Engineers representing the Bureau of Mines take exhaust and mine air samples at the seasonal changes, and the results under these atmospheric conditions are all gratifying.

The equipment we are using is a Taylor truck with the Cummins HB4 diesel engine. We have a trailer behind the truck that holds 11 tons, loaded by a scraper caterpillar, and we are averaging about 350 tons per shift.

Diesel Haulage in Underground Mines—Locomotives

By C. W. Plumb, Gen. Mgr.,
Idarado Mining Co.

IN the Treasury Tunnel of Idarado Mining Company, located at Ouray, Colo., elevation 10,600 ft., diesel locomotives have been used on the main line underground haulage for more than one year with very gratifying results. Treasury Tunnel is now in about 13,000 ft. from the portal. The first 5,000 ft. is of old-time construction, and is narrow and steep, with grades in places up to nearly 2 per cent.

Due to the low back in this first portion of the tunnel, it was decided that it would be too dangerous to install an electric trolley for haulage purposes. After having received written permission from the Commissioner of Mines of Colorado, it was decided to try out a diesel locomotive on the main line haulage. A new conditioner for controlling the gases from the exhaust had recently been perfected and after looking into this very important item, we were convinced the use of the diesel underground would be safe and reliable.

Our present diesel has a weight of approximately six tons and a rating of 65 hp. Mine track is of 45-lb. rails and has a 24-in. gauge. Granby type cars of 60 cu. ft. capacity are used in the ore haulage. Treasury Tunnel at present is a dead end and will be until connection is made with the old Black Bear workings 1,100 ft. above. Ventilation at present is through an 18-in. pipe line, with large suction fan located at the surface and a booster fan installed in the circuit at 8,500 ft. in. Five thousand cubic feet of air per minute is handled to the headings.

We have been well pleased with the use of the diesel on our underground haulage and although it is somewhat small for our present requirements, we can state that so far as gases are concerned, this hazard has been negligible. As to the use of the diesel in underground transportation, i.e., as to safety, flexibility and to economy of operation, we are very much pleased and can highly recommend it.

Under actual working conditions, 120 loaded cars have been brought out in one shift of eight hours from a distance of two miles. On individual trips as many as 26 empty two-ton cars have been pushed in. On the basis of 100 cars per eight-hour shift from the two-mile switch, 500 ton-miles of loads are brought out and 200 ton-miles of empty cars are pushed in, making a total of 700 ton-miles gross per eight-hour shift.

It is practically impossible to compare operating costs between our locomotive and the locomotive used in European practice, as we do not know the wage scale, prices, etc. However, if one wishes to calculate our costs it could easily be done in the following manner: In an eight-hour shift we can handle 120 cars that hold three net tons of ore. This ore is hauled a distance of two miles from the chutes to the mill bin. The transportation labor involved for this consists of two men—the diesel operator who received $1 per hour and the brakeman, who receives 94c per hour. Fuel oil consumption on an eight-hour shift is about six gallons. This costs us 10c per gallon. In addition, there is a small charge for lubricating oil and greases.

The problems of exhaust gas conditioners are numerous, since the exhaust is laden with unburnt fuel and lubricating oil which issues at high temperatures under extreme loads, and where the loads are prolonged the difficulty of dissipating the heat on a conditioner sufficiently small to be carried by the locomotive, was the problem in this operation.

The locomotive is equipped with Westinghouse air brakes. The compressor is force-feed lubricated from the engine system and cooled by the engine cooling water and is equipped with an unloader that keeps the pressure at 125 lbs. Due to the high humidity that exists in all mines, it is necessary to equip the receiving tank with an automatic drain which bleeds the water from the tank at intervals, furnishing dry air at all times to all the brakes.

Tests when the diesel has been in operation have been made by the U. S. Bureau of Mines on the air conditions in our tunnel. Recent tests, dated August 5, 1946, by U. S. Bureau of Mines contains the following sentence: "There was no carbon monoxide present, and only 13 and 17 parts per million, respectively, of oxides of nitrogen present in the atmosphere."

— *Discussion* —

Dr. L. E. Young (*Consulting Engineer, Pittsburgh, Pa.*) reviewed briefly the research that has been carried on in the prevention and control of toxic gases, where gasoline and oil fired equipment was being used. He pointed out that in considering the use of diesel equipment underground one had to remember four points: (1) Cost, (2) reliability, (3) practicability, and (4) safety features. He concluded by stating that the primary factor to be considered was adequate ventilation in the major air courses.

Developments in Underground Drilling and Blasting Practice

By W. T. Warren
Gen. Supt.
National Tunnel and Mines Co.

Text of Mr. Warren's paper appears in full at pages 39-42 of this issue.

Truck Haulage, Castle Dome Open Pit

By B. R. Coil, Gen. Supt.,
Miami Copper Co.

THE Castle Dome Copper Co., Inc., operates an open pit mine and concentrator located about 9½ miles west of Miami, Gila County, Ariz. The terrain is extremely rugged, typical of the Pinal Mountains. The nearest railroad is located at Miami, and all supplies have to be hauled 10 miles. Concentrates are hauled 9 miles and loaded into railroad cars for switching to the nearby International Smelting and Mining Company's smelter.

Miami Copper Co. obtained the property and began a churn drilling program in 1940, with the idea of developing ore for future reserves. With the advent of World War II, and the resultant copper shortage, the Defense Plant Corp. became interested in the property and decided to develop it as a complete unit. Miami Copper Co. then organized the Castle Dome Copper Co., Inc., a wholly-owned subsidiary, to operate the mine and plant.

The ore body lies on the south face of the mountain, known as Castle Dome, and the predominate rocks are quartz monzonite and quartz monzonite porphyry of Pre-Cambrian Age. Both chalcocite and chalcopyrite are present. The ore body is overlain with from 60 ft. to 100 ft. of leached capping.

The ore body has a maximum length of 3,300 ft. and an average width of 500 ft. measured in the plane of a working bench, and a maximum thickness of 385 ft. measured from the top bench or level to the bottom level. The ore body contained an estimated 29,000,000 tons, assaying an estimated 0.741 per cent total copper. An ore cut-off is made at 0.40 per cent sulfide copper.

Stripping consisted of stepping the south side of the Dome in 40-foot benches so there would be a 45-degree overall backslope from the bottom of the ore body to the top of the mountain. Benches were carried around the Dome and the waste material was dumped on the north side. A saddle joined the Dome on the east at the 4,470 level, and all waste below this elevation had to be hauled around the west side of the Dome.

The standard cycle of operation is followed. Banks are drilled by 29 T Bucyrus-Erie electrically operated churn drills using 9-in. bits. Holes are loaded and blasted with No. 3 quarry bag powder or 40 per cent special gelatin dynamite or a combination of both, in the softer material. In the harder material, a combination of 70 per cent bag powder and 60 per cent special gelatin dynamite is used. Two lines of plain primacord are used to detonate each hole, and crushed ore (ball mill feed) is now used for stemming. Ore and waste are loaded into 30-ton dump trucks by 4,161 Marion electric shovels with 5 cu. yd. buckets.

In planning the mining operations, it was decided to use truck haulage rather than rail haulage for the following reasons:

1. The small tonnage in the ore body pointed toward trucks because of a smaller capital investment.

2. The mine would be a one-level mine as far as ore production was concerned, and truck haulage would be more flexible than rail haulage especially for handling the included waste.

3. Because of the topography, there was available space for waste dumps within a short haul, and the average ore haul was within reason for truck operation.

4. Half of the ore would move downhill or level, and there would be no dropcut levels.

The shovels work in the pit so that a truck can be spotted on either side of the shovel. This reduces the arc of shovel swing, and allows a truck to be backed into the loading "spot" while the shovel is loading the truck on the other side. Two spotters are used at the shovel, one on each side so there will be no delay. Spotters keep the spot site free of loose rock, direct the driver in backing into the "spot" and remove any rocks that fall in front of the wheels. A dumpman is stationed on each operating dump to guide the drivers and remove rocks.

Trucks are brought to a building, near the ore dumps, once each shift for lubrication and servicing. Batteries are serviced once each week on Friday. A record is kept of the consumption of fuel, oil and grease by each individual truck. This record is used as a guide in determining the need for an engine overhaul and other repair work.

The 15-ton trucks which were originally used for scheduled operations are now used as standbys and for road work. The 30-ton trucks are preferable to the 15-ton trucks, because they haul more tons per unit per shift. The only saving in time in the truck cycle for the smaller trucks is the shorter loading time at the shovel, and this is not sufficient to offset the smaller load. Using the 15-ton trucks as standbys they are mixed in with the 30-ton trucks, and the time gained in loading is nullified by a waiting period as they take their turn.

Tires account for 20 per cent of the cost of operating the dump trucks, and the wartime shortage of tires has been the chief operating worry.

Experience has shown that it pays to keep the haulage roads in good condition, and a regular road crew is employed. This crew spends about 60 per cent of their time on mine roads, and the balance on similar work elsewhere about the property.

COMPARISON OF OPERATING COSTS BETWEEN 30-TON TRUCKS AND 15-TON TRUCKS

Based on cost during early part of 1944.

	Cost per ton-mile 30-ton truck	15-ton truck
Ton-miles hauled ...	1,014,920	256,432
Operating labor	$0.02199	$0.04792
Repair labor	0.01452	0.01441
Operating supplies ..	0.00028	0.00008
Petroleum products .	0.00536	0.01044
Tires and tubes	0.01943	0.01045
Repair supplies	0.01585	0.01189
Road maintenance ..	0.00995	0.00995
Total	$0.08738	$0.10514

Two-Way Shaft Communications System

By C. N. Kravig, Asst. Mine Supt., and Rex Tario, Elec. Engr., Homestake Mining Co.

AT Homestake, signaling systems have evolved from the simplest mechanical devices through more involved electrical annunciator methods to a two-way oral communication system in which a cage tender can speak to the engineer and receive a reply with the cage either moving or stationary. Until about 1916, shaft signaling was done by mechanically operated bells, operated by cage-tenders through small cables or jointed steel rods counter-balanced by weights or springs. This method served quite well for shallow shafts, but as depths exceed 1,000 ft. it became too slow and heavy to operate satisfactorily.

An annunciator system was developed and installed in one of the shafts in 1921. One conductor was connected from each pull switch to its associated relay coil in the annunciator box near the engineer's position. Operating a pull switch completed a ground return circuit energizing the signal bell and the relay coil which released an opaque door revealing the station number from which the signal originated. This system reached the peak of its development in the Ross Shaft which began operating in 1934.

The equipment in use at the present time in all operating shafts consists of two-way voice communication between engineers and cage tenders, with chair position indicators for all cages equipped with chairs. No effort will be made in this paper to depict in detail the circuits and equipment, as these have been thoroughly described in technical publications. It must be remembered, however, that improvements are constantly being worked out such as decreasing noise levels and developing more sturdy equipment where necessary. Maintenance and repair work consumes about 60 manhours a year for all of the equipment for one compartment of a shaft. This compares about equally with the maintenance of wire and annunciator systems.

The Homestake carrier current signaling system, consisting of a chair indicator and an oral communication system, whereby two-way communications by voice can be carried out from a stationary or moving cage, has proved very satisfactory over a period of more than six years. It is the standard means of shaft signaling at all three operating shafts. The older annunciator bell signal system is maintained, however, so two independent signal systems are available at all times though the bell signal is used only in case of rare failures of the carrier current system.

The advantages of the carrier current signal system which includes the chair indicator, are those of greater safety as well as greater operating efficiency; it is safer, faster, more flexible, and more comprehensive because more specific and detailed instructions are possible with oral communications. Cagers and hoisting engineers are highly in favor of the oral communication system.

The cager can communicate with the hoisting engineer orally while the cage is in motion, thus speeding up the work and often saving a trip. The cager frequently starts on a long trip when a call signal comes in from an intermediate level; with the carrier current signaling system he can re-signal the engineer while in motion, and the intermediate stop is made, thus the time required in waiting for cages is kept to a minimum. The actual signaling is much faster orally than by bells, thus, for the 3,800 level a signal 7-4 (seven-four) is given orally whereas by bells it is necessary to pull the bell cord seven times, pause and pull it four times.

A routine safety feature of the carrier current system is that of the cager informing the hoisting engineer of any heavy loads, or of special loads such as dynamite, blasting caps, or long material lashed to the hoisting rope such as pipe or rails, so that the engineer runs on reduced speed. Formerly the bell signals were executed slowly to indicate slow speed.

The hoisting engineer can communicate with the cager at any time without delay and this has proved useful in locating foremen or shift bosses in case of accident or other urgent business.

The carrier current system has certain shortcomings, however; it cannot be used by a cager who is not riding on the cage as is the case when hoisting long material such as pipe or rails. When moving the cage for loading or unloading long material the cager uses the bell signal system and the pull switch on the station.

— *Discussion* —

J. H. Hedges (*Chief, Tucson Division, Mining Branch, U. S. Bureau of Mines*) stated that the method of shaft signaling as described in this paper represents the last word in communication between cage tender and hoist engineer. He said that it is essential for safety that the hoisting engineer know at all times precisely what is going on down the shaft. The elimination of extraneous signals for the hoistman is a valuable improvement developed by this system. He said many other applications are suggesting themselves today, such as communication with haulage locomotives. Attempts to utilize radio communications underground so far have not been successful, but Mr. Hedges thought that continued investigations and advances in radio technique may some day overcome the obstacles which at the moment appear insuperable.

THURSDAY MORNING

Developing Ore Reserves for the Future

Ore Reserves and Future Exploration

By **Reno H. Sales**, Chief Geologist, Anaconda Copper Mining Co.

Text of Mr. Sales' paper appears in full at pages 30-34 of this issue.

How the United States Geological Survey May Serve the Mining Industry

By **R. N. Hunt**, Chief Geologist, United States Smelting, Refining and Mining Co.

IN speaking the other day with a young member of the United States Geological Survey, I laid emphasis on certain jobs I thought the survey might do greatly to the benefit of the metal mining industry of the West. I stressed two major functions of the survey in which in the past it has distinguished itself: first, that of mapping. Mapping not so much in present productive areas, which under favorable operating conditions the mining companies can very well take care of themselves, as in the regions surrounding them.

Second, I spoke of research on a scale rivalling that born of military necessity during the war and that of the great electrical and chemical industries before the war; first in geophysics, second, in certain fundamental geological problems on solution of which prospecting in the near future may perforce depend if we are to adequately sustain metal production in this country.

Not the least of several ways in which the administration and Congress may contribute to the prolongation of the vigor of our metal mining industry will be by generous financial support of the U. S. Geological Survey such that it may retain able men and occupy them to the fullest in a greatly expanded program of mapping research. By "generous financial support," I mean several millions appropriated in a manner avoiding annual uncertainty, assuring continuity in the survey's program and protection to its personnel.

In pushing our knowledge and mapping out into regions surrounding present districts and in mapping new areas potentially of interest, there is much for the survey to do, and all preliminary to actual development, whether by drilling or digging. The drilling and the digging the industry is glad to do and can do far better than can any federal agency. Furthermore, any government agency undertaking the direct development of prospects belonging to Tom, Dick and Harry in the long run will leave more enemies than friends behind it, for it cannot find ore in them all, and when it fails, well, some so and so just didn't know his business and drilled in all the wrong places. Intrusion of the government into the prospector's field can only discourage independent effort by individuals, small syndicates and companies. Rather the government should create and foster conditions conducive to efforts by the many.

As rapidly as it can obtain men the survey, I understand, plans greatly to expedite its mapping program. It has been suggested that the survey map regions round about and between active mining districts. Regions such as—to mention four in which are productive districts under active exploration: (1) The extensive limestone belt here in Colorado extending from Kokomo on the north, south and west through Climax, Leadville, Gilman, to Aspen and beyond. (2) The great volcanic pile of the San Juans of southwestern Colorado from Lake City and Ouray on the north to La Plata, Summitville and Creede on the south. (3) The Wasatch and Oquirrh ranges of Utah with the Salt Lake Valley between, a region enveloping Bingham, Park City and the lesser districts of Alta, American Fork, Stockton, Ophir and Mercur. (4) Much of Grant County, New Mexico: certainly that well-mineralized region in which Sam Lasky has already made a good beginning, extending from the old silver district of Georgetown southerly and westerly through Fierro, Santa Rita, Hanover, Pinos Altos, Tyrone, and the Burro Mountains. (5) A fifth might well be the foothills and lower west slope of the Sierras from Oroville to Madera—200 miles embracing the Mother Lode and a parallel belt of pyritic mineralization, which I suspect may be contained in a single story once it be deciphered.

During the past few decades the mining geologist has learned how to do a good engineering job of platting and projecting the geometry of the formations, veins, orebodies and structures within and along which the physical mine grows under the joint planning of the geologists and the operator and under the immediate direction of the latter. But once the maps are made, in questions involving the habits of veins and oreshoots, the alterations enveloping them, or mineralogical sequences within veins or in replacement deposits zoned across a district, relations broadly apparent can too seldom be used in firmly forecasting results in the specific case. Again, and I do not think I exaggerate, any thoughtful geologist is acutely conscious of his often complete inability to indicate with any confidence the original metal content of a deeply weathered outcrop or what may be found at depth, even when perhaps some energetic prospector preceding him has not tried to guess but has dug down a little way to see. He can only speculate, even though shrewdly. He is forced to draw too largely on his own personal experience limited as to place and extent by the circumstances of his travels and livelihood.

Surely applied geology is a field which cries out for such organized research as we have seen the fruit of in a score of industries and during the war in the magic of radar, marvelous synthetics and in the crowning triumph of the atomic bomb and all it signifies for the future.

Paralleling research in strictly geological problems is the job of catching up with the oil industry in the application of geophysical methods to our exploration problems.

Much costly experiment and research will be necessary to evolve the means of applying a very considerable amount of dependable geophysical knowledge to our exploration problems both surface and underground. How successful we shall be we cannot know until we try. But there is reason to hope the geophysicists may find tools for the mining geologist also. I am told the survey has geophysicists on its staff who plan certain field studies in aero-magnetics. The attempt to evolve geophysical and geochemical techniques applicable to mining problems is also research in which we hope the survey's efforts will not be limited by timidity or funds.

The Role of the Geological Survey in Mineral Exploration

By **W. E. Wrather**, Director, U. S. Geological Survey

IN January of this year, I expressed the confidence of the Geological Survey that this country's mineral reserve situation is far from bankrupt, that depleted reserves in many mineral commodities can be replenished, at least in part by the discovery of concealed deposits. I asserted also that in the future, successful prospecting will depend in large measure upon long-continuing, diligent research and relatively more expensive methods of exploration, but that in the light of industrial trends and national requirements we must accept the challenge and get on with the job.

I have on various occasions expressed to you what part I think the Geological Survey might play in a comprehensive program of exploration, but these aspirations must remain in the realm of pious hopes until implemented by some concerted and purposeful action. That time will come only when we have all reached agreement on several important and fundamental particulars. The Survey should not attempt to lay out an independent program of exploration disregarding all but its own viewpoint; such a course would be foredoomed to failure.

We still consider our three major functions to be the preparation of adequate topographic and geologic maps; studies in fundamental geologic research aimed at the development and refinement of geologic techniques and concepts; and the appraisal of the mineral resources of the nation. I believe past records show clearly that these are the fields in which a Federal agency is peculiarly fitted to serve. We are all fully aware that the Geological Survey has not made as great strides in these fields as we would have liked. All too few of the mining districts have been subjected to the continuous study necessary to keep records up to date and to preserve and interpret the ever-accumulating geologic data. Adequate maps of many promising areas are not available to guide prospecting, and all too little detail is known of the nation's mineral resources.

What are some of the duties the Survey should perform in the realm of mineral exploration and how far should its activities go?

I do not think that any of us want to see the Government, through the Geological Survey or any other agency, delve deeper in the affairs of mining than is necessary. As a general principle, I believe that the work of the Federal Survey should only proceed to the point where private industry can or will take over. Therefore, the activities of the Survey in the field of mineral exploration should presumably represent the public interest in undertaking work which (a) private groups either cannot undertake, (b) will not undertake, or (c) cannot do as well as a Federal agency.

For example, since geology is a fundamental technique in the search for and development of mineral resources, it is essential that the science of geology should be aggressive, and attuned to the

progress in other fields of science. This can only be achieved if an active program of basic research is maintained. Current studies in rock alteration as a guide to ore finding and the adaptation during the past two years of the airborne magnetometer to practical problems of prospecting give proof that the spark of imagination and ingenuity continues as an activating force in the Survey.

By work that industry cannot be expected to do, I mean work that involves financial risk beyond the promise of profitable returns, but work which must be done because of its importance to the national safety and public welfare. In this category are all too many of the so-called strategic minerals; minerals in deficient supply, which may possibly be developed to the status of stand-by sources for emergency purposes.

As to work in mineral exploration that can be done better by a Federal agency than by private groups: Regional mapping and widespread correlation studies have long been an important part of the Survey's stock in trade. I do not think there is any disagreement as to the desirability of this work being done by the Survey. Mineral deposits are geological, not political, entities. The use of a real and structural geology in mineral prospecting is so widely recognized that it is unnecessary to expand on the topic. It is also desirable to map all available mine openings, whether productive of ore or not, for only by piecing together all available data can a reliable geological interpretation be made.

In addition, I believe the Survey should continue to make mineral resource studies and appraisals on a nation-wide front, commodity by commodity. This is essentially a geological job. The data are urgently needed by the policy makers of the Government and the nation. Without them governmental action affecting the mineral industry is seriously handicapped. Without such data how is a program such as that called for by the recently enacted Stockpiling Act to be administered intelligently?

The Survey can make no long-term promises of effective research on the basis of a year by year allotment of funds. The scale of its activities are subject to the recommendations of the Bureau of the Budget and the will of the Congress. In presenting our case each year before these tribunals we necessarily find ourselves in the role of special pleaders, competing with numerous other Federal agencies for the right to carry out our plans. In the absence or near absence of supporting evidence other than our word, we cannot blame these guardians of the public treasury for discounting our claims and trimming our sails.

Treatment of New Mining Ventures in Canada and the United States

By **Ira B. Joralemon,**
Consulting Engineer

WHY has Canada found many more new mines in the past 15 years than have been found in the far greater and richer United States? This question can be answered in a dozen ways, depending on the economic and geological theories of the one who does the answering. It demands an answer, as the striking difference in the exploration records of the two countries should throw some light on the whole vital question of future mineral development.

Statistics on the number of new mines are hard to obtain, and are certainly incomplete. However, the contrast between the two countries is so great that errors or omissions will not affect the conclusions. In Canada since the beginning of 1930, at least 65 fair sized new mines have come to production.

Compared with this remarkable Canadian record, only 15 or 20 United States mines of comparable size, including gold dredges, have come to production since 1930. Several even of these mines, like Bagdad, Castle Dome, Gray Eagle and Resurrection, were known long before 1930. More than five times as many actual new mines have been found in Canada as in the United States. Why?

The advocates of the Have-Not theory claim it is because there are few new mines left to find in the United States. This theory is at best of dubious validity. Many of the Canadian mines resulted from drilling, often after geophysical exploration, in areas where mineralized outcrops were almost completely lacking. Practically no such exploration has been done in the United States. Until the same efforts have been made at home as in Canada, pessimism about possible American discoveries is pure defeatism, with no dependable basis, save, perhaps, a permanent loss of the venture spirit.

Enthusiasm for new ventures is indispensable for finding new mines. If we don't hunt for new mines, we don't find them. The United States had this venture spirit to a pre-eminent degree in the first two decades of this century, and as a result, made the greatest mineral discoveries in history. Canada has it now.

Contrasted with the Canadian mining registration law, with its complete trust in the honesty and discretion of the Registrar, from 1933 to 1941 the United States' procedure was established by extremely detailed and complicated regulations of the Securities and Exchange Commission. Only issues of less than $30,000 were exempt from registration in these eight years. When more than this amount was needed, a staggering number of forms and reports had to be submitted with the registration application. Only specialists stood a chance of meeting the requirements successfully. Fees to engineers, attorneys and accountants, together with other necessary expenses, amounted at best to many thousand dollars. Instruction forms were so complicated that it was almost impossible to have the first application correct in all details, and a long delay and additional expense were necessary before the commission was satisfied. One could hardly avoid feeling like a criminal before the inquisition was completed. There could have been no more effective deterrent to the obtaining of public participation in mining ventures than the old S. E. C. requirements.

Public participation in exploration in the United States is further complicated by the fact that in most states registration by the State Corporation Commission is required, whether or not federal registration is called for. State laws usually give the commission almost as much discretion as that enjoyed by provincial registrars in Canada. The fact that two separate authorities must pass on the issue is another deterrent to raising of development money by stock sales.

The essential difference between Canadian and United States registration of new mining companies is that Canada tries to do all it can to encourage development of new deposits, by the public as well as by existing companies, assuming that the development is an honest speculation unless there is obvious fraud. The federal and state authorities in the United States have seemed to assume that most requests for public participation in exploration companies are fraudulent, and so have made it extremely difficult for the occasional honest development, as well as for the crooked ones, to get public backing.

The tax laws that apply to the successful companies emphasize still more the difference between Canadian and United States treatment of new mines. In Canada the aim is to encourage development by allowing sufficient exemption from taxes to permit the individual shareholder, as well as the company, to get back free of tax the average investment in all ventures, unsuccessful as well as successful. In the United States this principle is accepted to a limited degree for companies through percentage depletion, but the individual shareholder with a large income stands no chance of getting his investment back unless the mine is fantastically successful.

Tax laws both in Canada and in the United States are so complicated that this brief summary can only show that Canada is trying to make the development of new mines a profitable business. The United States taxes the successful venture to the breaking point, with little attempt to compensate the investor for the risks he must run in helping to find new properties.

Canada has shown the way to find new mines, both through its use of modern prospecting techniques and through government encouragement of exploration and prospecting. Both Dominion and provincial authorities have done all they can to make the pot worth the ante. Similar laws and sympathetic administration in the United States would go far toward bringing about a revival of the venture spirit.

— *Discussion* —

Sherwin F. Kelly (*President, Sherwin F. Kelly Geophysical Services, Inc.*) in discussing the general application of geophysics to mining exploration, pointed out that geophysics as it stands today will not discover ore as such. The role of this science is distinctly that of one step in the chain of ore finding. He felt that the American mining industry has not been appreciative of geophysical methods and stated that in Canada geophysics were used to a far greater extent than in this country. Mr. Kelly thought that this method of exploration has been very valuable in Canada in eliminating negative areas.

MILLING—SAFETY

New Developments in Milling

By S. R. Zimmerley, Chief, Salt Lake City Div., Metallurgical Branch, Bureau of Mines, U. S. Dept. of the Interior

IN a recent article, E. H. Rose, chairman of the milling committee of the A. I. M. E., has surveyed the general subject of this paper in a comprehensive manner and, through the reporting facilities of the members of the milling committee, has collected several hundred references to new developments and operations in milling. It seems advisable, therefore, to limit the field of the present paper to a few subjects of general interest that represent trends in milling practice or that, upon further development, may result in new advances in the practice of mineral beneficiation. The subjects to be discussed are as follows:

1. Application of new methods of ore concentration to low-grade materials.
2. Advances in grinding and classification.
3. Improved separation of minerals in flotation by heating to induce surface alterations.
4. Dry concentration by preferential attrition grinding and air classification.
5. Some new uses of SO_2 in smelter gases for metallurgical purposes.
6. Ion exchange resins for the recovery of metals from solutions.

The important field of beneficiation of iron ores has been omitted entirely.

(As Mr. Zimmerley's paper will be published at a later date in Mining Congress Journal, only the introductory paragraph is given in this abstract.)

— *Discussion* —

R. Schuman, Jr. (*Associate Professor of Process Metallurgy, Massachusetts Institute of Technology*) pointed out the rapid change that is taking place in the field of milling and ore concentration. As we are being forced to mine and mill lower and lower grade materials, we are being forced to develop new operations of a different character where the primary emphasis is less on efficiency than on low cost and on producing discardable tailings. He pointed to the trend towards "preconcentration" and defined it as a means of making ore from worthless rock, the resulting "ore" to constitute good mill feed for a more conventional milling system. He said the art of using flotation reagents has attained a high state of development, that attention is now being turned towards specific details of the process, towards the more physical and mechanical aspects of froth production.

Carbon-Cyanide Mill Tests at the Getchell Mine, Nevada

By R. A. Hardy, Consulting Engineer, Getchell Mine, Inc.

BACK in 1939, and before that date, Getchell Mine realized its ore was inherently a difficult ore to treat and in view of a contemplated increase in tonnage to the mill, the management started investigating and developing the carbon-cyanidation process for the recovery of gold from cyanide pulps, by experimenting on oxidized strippings removed from the Getchell vein carrying low gold values. This process, with improvements made by Getchell, offers great possibilities in metallurgical treatment and simplification of plant with consequent lessened capital expenditures.

Milling Getchell ores has not been satisfactory due to a large proportion of bentonite in the ore and a heavy post-mineral fault gouge of bentonite which is mined as ore. With ore of such character an excessively large settling area was required for thickening and a very poor cake on the filters resulted in a large soluble gold loss.

The application and development of the carbon-cyanidation process to these ores was undertaken by T. G. Chapman, of the University of Arizona, F. W. McQuiston, Jr., metallurgist for Newmont Mining Corp., along with the Getchell Mine metallurgists, J. N. Davis and Royce A. Hardy.

The principles of carbon-cyanidation have been described by Chapman and von Bernewitz. This paper deals with the results obtained in the use of carbon-cyanidation on Getchell oxidized strippings in large scale mill tests involving 5,000 tons.

Three methods of separating the carbon from the ore pulp following dissolution and absorption of the gold have been thoroughly tested in the Getchell laboratories; namely (1) Flotation, (2) Screening, and (3) Confining the carbon in a screen in contact with the ore pulp during the dissolution and absorption. The first two methods have been tested on a mill scale at Getchell Mine and it is expected that the third method will be tested on a mill scale in the near future.

The results obtained when the mill was considered to be operating satisfactorily follow:

FLOTATION RESULTS

		Assay ozs. gold per ton		Extraction in per-cent
Heads	Tailings	Barren solutions	Concentrate	
0.033	0.0078	0.00050	7.35	73.4
0.055	0.0075	0.00025	2.40	85.7
0.100	0.0140	0.00050	2.00	85.7

The consumption of activated carbon amounted to 1.0 lb. per ton of material assaying 0.06 oz. gold per ton. Lime and cyanide consumptions amounted to 6.0 and 0.50 lb. per ton of stripping respectively.

Two weeks of milling approximately 250 tons per day definitely demonstrated that carbon-cyanidation-flotation is a practical process and is applicable for milling on any scale slow-settling ores.

The second method of carbon-cyanidation used comprised the addition of coarse hard activated carbon to the ground pulp with subsequent screening of carbon from the pulp. The particular carbon used was minus 12-mesh and plus 30-mesh and was made from walnut shells and apricot pits and could be classed as a medium hard carbon. A vibrating screen with the equivalent to a 35-mesh screen cloth was used for the separation of the carbon from the ore pulp.

The strippings milled varied in value from 0.03 oz. to 0.10 oz. gold per ton. The last half of the mill test gave the following results:

SCREENING RESULTS

		Assay ozs. gold per ton		Extraction in per-cent
Heads	Tailings	Barren solutions	Concentrate	
0.06	0.01	0.0004	15.69	80.7

Very little abrasion of the carbon was evident, even after recirculation in which the carbon was screened several times.

This carbon-cyanidation process requires the carbon to be much larger in size than the largest ore particle. Screening finer than 30-mesh does not appear practical; therefore cyanidation following a coarse grind requires a large size carbon.

Although this method of avoiding the necessity of separating the carbon from the ore pulp following the dissolution and absorption of gold has not been tested as yet on a continuous mill scale basis, many large scale experimental batch tests have been made and this method offers considerable improvement in comparison to the other two methods described. Two hundred pound batch tests indicated that the extraction is as satisfactory, and the simplicity of plant would be of advantage. In the activated carbon-cyanide process it would appear that combining the operations of dissolving gold, absorbing gold, and separating the carbon from the ore pulp in one step offers the maximum simplicity of cyanide plant operation.

Safety Training For Post-War Mine Operation

By A. H. Zeilinger, Safety Engr., Colorado Fuel & Iron Corp.

POST-WAR mine operation, just the same as other operations, will have the veteran very much in the picture. The veteran is pretty tired of taking orders. He's had a lot of that during his period of military service but still he knows that someone must give orders and instructions and so he will accept them if he is approached in the right manner. He's also fed up on training. All during his career in the service he's been in one training program after the other but still he can see that he can get ahead faster if trained for the work he is going to do. Long ago he came to hate red tape, and for this I do not blame him, but still he can see that there must be some routine, some plan of procedure in any sized organization and I am sure he will accept that also if it is properly presented. Now, above all, he's restless.

He may not stay hitched. These days it's easy for him to believe there are greener pastures farther on; and it's quite easy for him to get another job most anywhere.

Now as to safety training proper, I desire to state that any employe must really be sold on his job before he can be sold on the safe way of doing it. That is imperative if we hope to make a worthwhile impression on him with *any* training program for safety.

Then the first step in Safety Training for Post-War Mine Operation should be for a qualified supervisor to see that the employe is sold on his job.

So in selling the employe on his job, use must be made of these five steps in their order: Attention, Interest, Conviction, Desire and Resolution.

Now, inasmuch as we are living in a machine age, our mines will be more and more mechanized, and so we must train *for* this age. Increased use of machinery will bring additional and new hazards from time to time. Thus we see a greater need for more safety training in our mining operation, and the necessity for it being continuous and progressive.

Various courses may be suggested to do this training or at least the basic part of it, but after conducting a number of different courses in safety, I have been sold on the following short course which I shall call the Ten-Hour Course. The object of this course is to provide a systematic educational program in safety for employes, both supervisors and workers. The plan provides for five two-hour sessions and the sessions should be conducted by a leader versed in the conference type of instruction because these meetings are strictly of a conference nature. Each meeting will cover two of the following ten subjects:

1. What are the causes of accidents?
2. How can the cause of an accident be found?
3. How can accidents due to faulty environment be prevented?
4. How can accidents due to faulty human behavior be prevented?
5. How can lack of skill and wrong attitude be eliminated as accident causes?
6. Is every accident due to just one cause?
7. Analyzing plant records.
8. Handling employes' safety suggestions.
9. Plant inspections.
10. Job analysis.

Now to get down to a more detailed picture of this course, it can be said that the causes of all industrial accidents fall under two general headings: Faulty Environment or Faulty Human Behavior.

Under Faulty Environment there are six subheads:

1. Improper guarding.
2. Defective tools, materials and equipment.
3. Hazardous arrangement.
4. Improper illumination.
5. Improper ventilation.
6. Unsafe dress or apparel.

Under Faulty Human Behavior there are three subheads:

1. Physical or mental condition.
2. Lack of knowledge or skill.
3. Improper safety attitude.

The above nine causes of industrial accidents are all developed by the skillful conference leader in making use of material presented by the group. These causes are prepared in chart form and each member of the group gets a copy later in the session.

When it is definitely agreed upon that industrial accidents are the result of causes, then it is logical that we must find the causes before we can apply the remedy. We have discovered that these causes can be found by:

1. The investigation of every accident.
2. Studying results of investigations in other operations.
3. Inspections, job analysis and study of mine records.

After we have found the causes, we will observe that those causes all fall under the nine classifications mentioned above, the six subheads under Faulty Environment and the three subheads under Faulty Human Behavior. The Faulty Environment causes may be considered physical causes which may be corrected by engineering means and the Faulty Human Behavior causes may be considered personal causes that may be corrected by education and training.

— *Discussion* —

Edwin J. Eisenach (*Safety Engineer, Climax Molybdenum Co.*) stressed the importance of the personal approach in matters of safety. He pointed out that a new man coming into the mining field does not have the experience and background for a mining job. He said that the safety department of a mining company should never be the department a man wants to shy away from. He felt that one of the important functions of such a department was that of answering questions and sometimes it is necessary to answer a question that is totally out of the safety field. He also indicated that safety inspectors should be men who have had actual work in the type of job they are going to be inspecting.

Daniel Harrington (*Chief, Health and Safety Branch, U. S. Bureau of Mines, Department of the Interior*) stated that fundamentally the problem of attempting to hold accident occurrence and ill health in the mineral industry to a minimum involves the combination of education and discipline; and the success of the program requires that it embrace not only the workers, old or young, new or experienced, but also the supervisory officials from the top to the bottom. Above all the program must be continuous, day in and day out, rather than spasmodic. He felt it advisable to have all new employes, whether experienced or inexperienced in mining, do their initial work in a section of the mine under close supervision of capable, diplomatic supervisors until the men are well acquainted with safe and efficient procedures before being assigned to the more hazardous work, some of which must be done in every mine. He stated that the problems confronting the post-war mining operators are by no means simple of solution. He felt that normal conditions might not return for a long time and that many mining people will for some years to come be forced to try one expedient after another to secure safe operations.

THURSDAY AFTERNOON

General

Current Status and Potentialities of Geophysical Prospecting For Ores

By **Louis B. Slichter,**
Prof. of Geophysics,
University of Wisconsin

THE serious consideration which is now being devoted to all phases of the problem of our mineral reserves has inevitably also focused a certain degree of attention on geophysics, as one of the young, and we hope, growing exploration techniques.

What is the present status of geophysics, and what are its potentialities in mineral prospecting? This is a good crisp question, and it appears to deserve a clear, careful answer. I believe, however, that there is danger of missing the main point in speaking too narrowly on a question of this type. It is as if one should ask, "What are the potentialities of the Brunton compass in prospecting?" These things are merely tools to an end, tools which are used to obtain desired data, which data are important only in so far as they contribute to the larger general plan. Seldom should an individual tool or method be credited with the solution of a problem, or the discovery of ore. Because in some instances geophysical methods afford nearly direct evidence of ore, there is an unfortunate tendency to regard them in a separate category from all the other instrumentalities in the geologist's bag. Every tool has its special uses and definite limitations, and those of complicated type require knowledge and skill for their successful use. They must be used appropriately, with the grain of the problem, so to speak, and unless understood they can be more of hazard than a help. One has to get the feel of a new tool by use and experience.

Mining companies should acquire expert knowledge of the geophysical tools by continued and direct participation in their use. Therein, I believe, lies the most important opportunity for improved results from geophysics. There has been too little basic understanding of these methods by those who must use them, who must fit together for final conclusion all the varied types of evidence which apply to the problems, and in the end must be responsible for results. In the past, utilization of geophysics has often been sporadic, through short-time contracts with outside consultants. Such intermittent use may be valuable at times, but it leaves much to be desired as a method of promoting a true understanding of geophysics by those responsible for exploration. Too often each new geophysical job starts at about the same technical level of ignorance as its predecessor. The orderly growth of geophysical competence in so complex a field as ore exploration demands at least some measure of research inside the company's own exploration department. It is important to build up a "know-how" within

the company, to conserve the assets of experience and research. I emphasize the value of work by the company's own organization, because I think that as much gain will result from greater skill in using the methods as from improvements in the methods themselves. Furthermore, those who need and who use tools of exploration and who must assume the final responsibility for results may be relied upon to furnish the keenest stimulus to progress.

Of the two main types of geophysical prospecting methods, the flux methods and the wave methods, only the former class, which embraces the gravitational, magnetic, and electrical methods, has received wide application in mining prospecting. These methods are subject to basic limitations as to range, which arise primarily from the complexities of the geological conditions, rather than from instrumental limitations. Accordingly, a general statement concerning ranges, without reference to the geological conditions, must necessarily be unsatisfactory. Usually, however, ranges are less than one or two mean diameters of the structure being explored. Simple model techniques are useful in the interpretation of electrical and magnetic methods and deserve more general use.

In the inductive method, higher instrumental sensitivities are desirable, and can be obtained. The inductive method offers opportunity for important improvements, both in instrumentation and field operation. In the other flux methods improvement will chiefly come from increased knowledge of the methods, and greater skill in their use, and interpretation.

Electrical methods offer a powerful method of revealing conducting ore straddled by drill holes, and are otherwise useful in promoting the economy and effectiveness of a drilling campaign. More extensive use of electrical methods in connection with drilling and underground workings is urged.

The seismic method is the only wave method suitable for geophysical prospecting, and is inherently far superior to the flux methods in accuracy of determining positions or outlines of concealed structures. It is also capable of far greater ranges of penetration, so that depth of overburden is not so serious a limitation. However, there appear to be basic difficulties in operating the method in the higher frequency ranges required in most ore prospecting problems. The desirability of adequate research designed to investigate all phases of the application of seismic methods to mining problems is urged. The immediate job in ore geophysics is to learn how to operate geophysics at substantial profits. The easiest and most attractive geophysical prospects are undoubtedly still waiting to be found. Perhaps the cream of them can be discovered and exploited by those who first make a general and thorough analysis of the situation, as a basis for rational geophysical ventures. This analysis will require high geological competence and imagination coupled with sound knowledge of the capabilities of geophysics.

In the past, very little research effort has been devoted to basic problems of ore geophysics. Important aspects of this subject still remain open for technical investigation. Continued research on an adequate scale and intimately integrated with practical exploration departments is needed to reveal fully the true potentialities of the new geophysical tools.

Public Land Policies in Relation to Mining

By **Joel D. Wolfsohn**, Acting Associate Director, Bureau of Land Management, Dept. of the Interior

THOUSANDS upon thousands of mining locations have been listed in recording districts and in the various offices of county recorders. Many of these locations have been patented under the United States mining laws. Upon issuance of the patent, the lands involved pass from the jurisdiction of the Government and no longer are a part of the public domain. By far the greater majority of these recorded locations, however, are unpatented and are held either under possessory title or have been abandoned. Notwithstanding the fact that these unpatented and abandoned locations are still a part of the public domain, there is no record of them in any office or agency of the Department of the Interior, the custodian of the public domain.

This legally enforced lack of knowledge on the part of the Department with respect to mining locations is a serious handicap in the Department's administration of other public land laws—for example, the issuance of leases and permits under the general mineral leasing act of 1920, as amended.

The lack of any law requiring the recordation of mining locations with the appropriate agency of the Department of the Interior is also a distinct hazard to the miner. Portions of the public domain have been withdrawn from mineral location under the mining law for public purposes. Unless a mineral prospector consults the records of the appropriate district land office before he records his notice of location, he may be locating upon land which has been withdrawn and is not subject to mining location.

The remedy, of course, rests with the Congress. I suggest that we join forces in supporting legislation which will require all mining locations to be recorded in the appropriate offices of the Bureau of Land Management, Department of the Interior.

Now let us look at the situation with regard to mineral patents. While the law provides for patenting a mining claim, there is no requirement of law that a patent must be obtained. The owner of a valid mining claim may hold possessory title to the claim indefinitely without applying for a patent, provided he complies with the law as to the expenditure of not less than $100 annually in labor or improvements on the claim.

Without doubt there are hundreds, if not thousands, of mining claims which ought to be patented, but which have not been so patented. The effect is to leave on the public domain possessory rights, some valid, some invalid, which make administration of the balance of the public domain more difficult. During the fiscal year ending June 30, 1946, only 77 patents were issued.

From time to time in the course of our work we discover that mining claims have been filed and locations recorded with the county or other recording officer which are allegedly for mineral purposes, but actually are for anything but mineral purposes.

Even in peacetime, legitimate users of the public domain, including the Federal Government, are constantly being impeded by the assertion of spurious claims. The lack of necessity to record with the Federal Government, the suspension of assessment work for the last 13 years, the lack of urgence to secure patent on the land—all have mitigated to make it possible for those who are not really interested in developing the minerals of the country to hold lands allegedly for mining purposes, but actually for many other purposes. I bespeak your cooperation in trying to find some way by which proper mineral utilization of the public lands can be brought about.

There has been much confusion on the subject of land withdrawals. Statements have been heard in the West to the effect that these withdrawals represented an unconscionable "taking" of lands by Federal agencies.

Of course large areas have been taken during the war. We hope that many of those areas will be quickly restored to public use. However, in order to assure that ample consideration and understanding of the views of the public at large with regard to lands intended for withdrawals or sought for withdrawal, can be had, Secretary of the Interior Krug recently issued Departmental Order No. 2232. By its terms generally, public hearings will be held before any land order becomes permanently effective. I am inclined to think that this will be a great boon and will remove many of the doubts which now cause irritation.

— *Discussion* —

W. C. Broadgate (*Technical Consultant, U. S. Senate Small Business Committee*) discussed the provisions of the proposed Geophysical Mining Claims Act of 1947 which is under the process of being drafted by Senator James E. Murray and the Sub-Committee on Mining and Minerals Industry, of which he is consultant. He pointed out that this new bill was the first major change in the mining laws which had been proposed for a number of years.

The present bill, Mr. Broadgate said, in no way amends the mining laws except to create a new class of mining claims, the title to which may be held for a limited time while prospecting is under way. He said one of the difficulties facing those who draw up the bill is that of securing a good definition for geophysical prospecting. No two people seem to agree, and the definition which they now have is a combination of a number of engineering and scientific terms.

Mr. Broadgate then discussed in detail the numerous provisions of the bill.

Stockholders as a Public Relations Medium

By Leo J. Hoban, Treasurer,
Hecla Mining Co.

THE subject assigned to me, "Stockholders as a Public Relations Medium" narrows the field of useful discussion to such an extent that I have taken the liberty of including consideration of employes and the public as well as of stockholders. The relative importance of the three groups, in my opinion, is as follows:

1. The employe.
2. The public.
3. The stockholder.

In recent years management has become alive to the importance of fostering satisfactory relations with all of the elements which influence the conduct of the business. How successful the attempt has been is still a matter of conjecture. In some instances very definite progress has been made; in others, the results have been disappointing.

Management, and management only, can heal the gap between the employer and the employe. The workers are human beings, not differing from other humans. They react favorably to a favorable environment, and they resent unfairness. The employer should get out of such a program about what he puts into it.

Paternalism, of course, should be avoided. Any hint of patronage, or a "papa knows best" attitude, will, in itself, cause failure to a program that otherwise might have been successful.

The attitude of the public towards a company has considerable bearing on its success. This is particularly true in one-company or one-industry communities. The natural resources industries seem to fall into this pattern more than is true of other classifications.

What the employe thinks of his employer will often determine what the general public thinks. It is most important, therefore, that employer-employe relations be on a sound basis.

There are other factors that will influence the public, and they are factors that are solely under the control of management. Purchasing policies of the company are one important element. Local business concerns are entitled to a fair share of the company's business. Purchasing strictly on a price basis, where local small business is at a disadvantage, will have adverse reactions.

Civic enterprises, within reasonable limits, should be aggressively supported. Swimming pools, parks, recreation grounds, local athletic teams and youth centers are all part of the community in which one lives. The more attractive they are, the better chance the community has of attracting and keeping permanent residents. Key employes of the company should belong to and take an active part in local Chambers of Commerce and in the various service clubs.

If satisfactory results have been obtained from the employe and public relations campaigns, the task with the shareholder is considerably simplified. Presuming that satisfactory operating conditions and reasonable profits have been attained, management's task is to ascertain those other subjects in which the shareholder is particularly interested, and then to disseminate the data necessary to satisfy the desires of the shareholder.

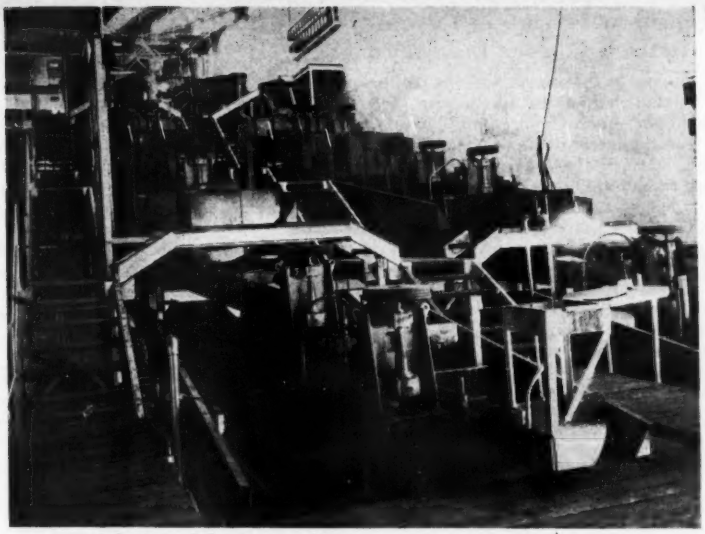
The general trend today is one of more frankness and more information than in times past. Certainly, shareholders are entitled to any information they desire, provided, of course, that the information does not conflict with the best interests of the company.

It may be said that the peculiar conditions inherent in an individual enterprise will determine the type and scope of the program to be adopted. Once adopted, the program should be persevered in, making necessary changes if parts of the program show signs of failure. Permanent results cannot be expected overnight. The proof of the adequacy of a program will be found in the result over a comparatively long period of time. A selected program, properly administered, is one of management's duties, and will amply repay the cost and effort over a period of years.

— *Discussion* —

Tom Lyon (*Assistant to Manager, International Smelting & Refining Co.*) commented on the need for shareholders in mining companies to be more vociferous in their demands on our lawmakers. He stated that the shareholders in the non-ferrous industry are inarticulate, principally because they have no idea as to what legislation is necessary to protect their interests. He suggested that a central agency be established and regular letters sent to all shareholders in the industry telling them of mining problems and asking their assistance in obtaining proper relief. He stated that most shareholders in mining companies were ignorant on five important subjects: (1) The price of silver; (2) the question of mining claim locations; (3) the work of the United States Geological Survey; (4) the regulations on mining of the Securities and Exchange Commission; (5) mine taxation. Mr. Lyon stated that the only way he knew to get this information into the hands of the members of Congress is for the shareholders in the industry to be sufficiently informed regarding the needs of the industry in legislative matters to furnish their Congressmen with information. Mr. Lyon emphasized that for such an effort to be successful, it had to be persisted in and not resorted to merely in emergencies.

Attractive housing units, such as the above occupied by an Arizona copper miner, contribute to good public relations



A battery of flotation machines in a western zinc-lead-silver mill

★

By W. W. DUECKER

and

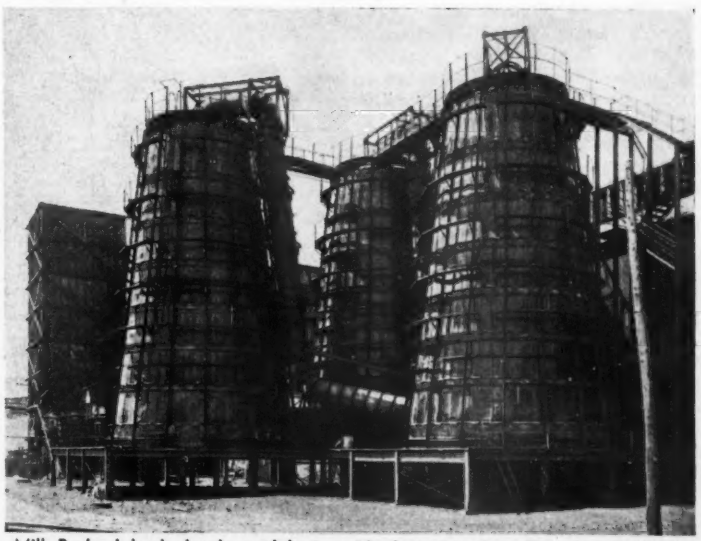
E. W. EDDY

Texas Gulf Sulphur Company, Inc.

★

Flotation Concentrates as a Source of Sulphur

The Most Recent Developments in Selective Flotation Have Made Available New Minerals to the Sulphur Industry and Brought About a New Alignment of Available Materials



Mills-Packard lead chambers-sulphuric acid plant, American Zinc Co. of Illinois, East St. Louis

INVENTIONS, technological developments and new processes often affect seemingly unrelated industries. Selective flotation had such an effect. It was developed and applied by the mining industry to improve the recovery of metals from ores. It brought about great changes in mining and metallurgical practices and had pronounced influence on other industries, particularly the sulphuric acid industry—an industry seemingly unrelated to metal mining and metallurgy. It brought about a new alignment in the types of sulphur-bearing materials available to that industry.

Development of Selective Flotation Has Accomplished Much

Prior to, and during World War I, most domestic mines had witnessed the almost complete exhaustion of the high-grade ores. The low supply of and the demand for metals therefore stimulated research on methods of treating low-grade ores. Flotation and other processes of concentrating valuable sulphide minerals were investigated. The first flotation processes made no attempt to separate the various sulphide minerals, the sole object being to eliminate as much gangue as possible. The concentrates produced generally were the mixtures of all the sulphide minerals contained in the original ore, and usually the iron sulphides or pyrites exceeded the

other metal sulphides in amount. The development of the selective flotation processes changed this. These made it possible to produce fairly high-grade sulphide concentrates of copper, lead and zinc, and to separate the excess pyrites from the concentrates.

Before the introduction of flotation processes and during the period in which they were being developed, that is, the period immediately preceding World War I, practically all sulphuric acid in the United States was made from sulphide ores. These included the sulphide ores used in the production of copper, zinc, etc., as well as pyrites, i.e., pyrite, marcasite and pyrrhotite. The sulphur in the sulphide ores smelted for zinc and copper had long been used for the manufacture of sulphuric acid. The practice was begun in this country in 1882 by Matthiessen and Hegeler in conjunction with their zinc smelting operations, and in 1907 the waste gases from copper smelters and copper blast furnaces were also being so utilized. In 1914 these sources accounted for approximately 24 per cent of all the acid produced in the United States. The major portion of all domestic acid, however, or 73 per cent, was made from pyrites and the remaining 2.6 per cent was produced from elemental sulphur.[1]

Only a relatively small portion of the pyrite, however, was obtained from domestic sources. The major portion, 78 per cent, was of foreign origin and the rest came from the deposits of California, New York, Virginia, Georgia and Wisconsin. Coal brasses from Ohio and Illinois also contributed to the supply. When shipping difficulties developed during World War I, acid manufacturers experienced great difficulty in obtaining enough pyrites from foreign sources to produce the enormous quantities of acid required. The production of domestic pyrites could not be expanded to satisfy the increased demands so acid manufacturers supplemented their requirements with brimstone which was being produced in increasing quantities in this country by the process developed by Frasch. The net result was that although in 1918 approximately 21 per cent of all acid was still being obtained as a by-product in the smelting of copper and zinc, the relative proportion made from pyrites declined. In that year[2], only about 27 per cent was obtained from pyrites, about half of which came from foreign sources, while 52 per cent was made from brimstone.

[1] Wells, A. E., and Fogg, D. E., "The Manufacture of Sulphuric Acid in the United States," Bull. 184, U. S. Bur. of Mines, 1920.

[2] "Mineral Resources of the United States," 1918—Part II, "Sulphur and Pyrite in 1918," page 377.

Flotation Processes Revolutionized Copper Industry

As has been indicated, the copper and zinc industries have long been important factors in supplying part of the domestic demand for sulphuric acid. Originally, the sulphur in the copper and zinc ores had been wasted. But because the wasted sulphur in some places caused damage to vegetation, the producers of copper and zinc were compelled in such instances to convert the unwanted sulphur into unwanted acid. At the copper smelter the quantity of acid produced was determined, not by the market for acid, but by the quantity of ore roasted. And, since the ore processed usually consisted of a mixture of all the sulphide minerals contained in the original ore, the amount of acid produced often depended more on the excess quantity of sulphur present as contaminating sulphides than on the copper content of the ore. Producers of copper, therefore, were among the first to utilize selective flotation to give them greater control over their operations. It enabled the mine to send to the smelter a concentrate of better quality—one containing a higher percentage of recoverable metal. It also made available to the smelter pyrites flotation concentrates for conversion to sulphuric acid if so desired.

The influence selective flotation has had on the joint production of copper and sulphuric acid by the copper in-

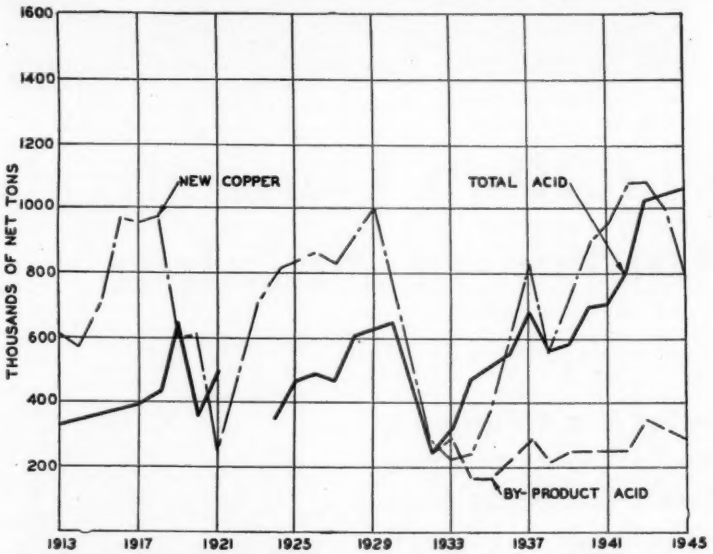


Fig. 1. Copper and 60° Be, sulphuric acid produced by U. S. Copper Industry

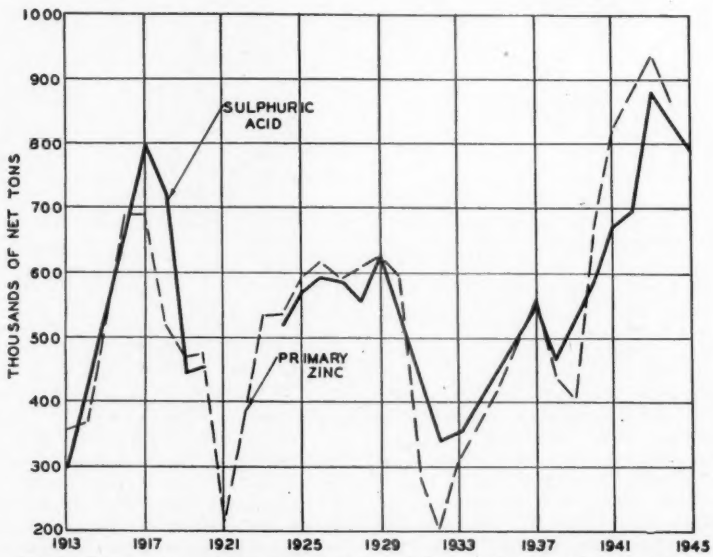


Fig. 2. Primary zinc and by-product 60° Be. sulphuric acid produced at zinc plants

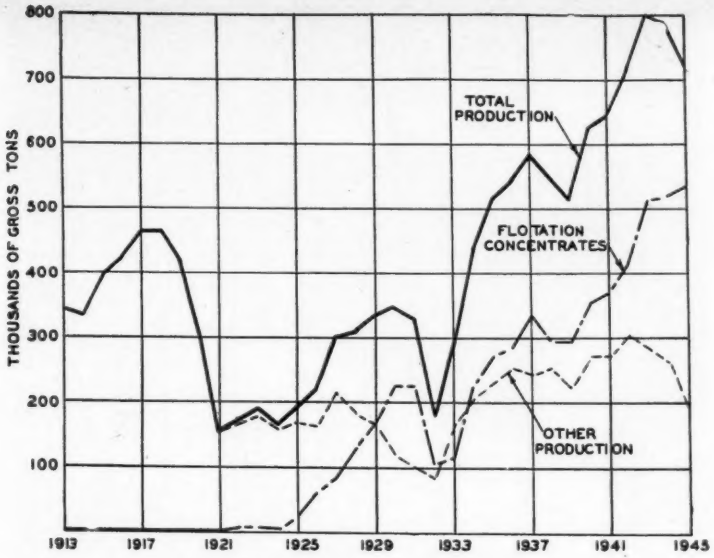


Fig. 3. U. S. production of pyrites

dustry in the United States is shown by the data provided in Table I and Fig. 1. Data have been published in "Mineral Resources of the United States" and "Minerals Yearbook" regarding the production of sulphuric acid by the copper industry. Initially, no attempt was made to identify the source of that acid, it being assumed that all of it was made from copper concentrates. This practice was continued after selective flotation had been adopted by the copper industry, and after this industry was using both copper concentrates and pyrites flotation concentrates in the production of acid. The production of pyrites flotation concentrates by the copper industry rose from 15,000 gross tons in 1925 to 200,000 gross tons in 1930. In 1934 this growth was recognized by statisticians and a new system of reporting was adopted. That year, and for each subsequent year, "Minerals Yearbook" reported only the acid made at copper smelters from copper concentrates although both copper concentrates and pyrites flotation concentrates were converted to acid at the same acid plant. In Table I, therefore, to illustrate the effect selective flotation has had on the production of acid by the copper industry, there has been listed not only the acid made from coper ores and concentrates, as indicated by the Bureau of Mines, but also the quantity of acid made by that same industry from the pyrites flotation concentrates obtained as a by-product in concentrating the copper ores.

During the period 1913-1918, prior to the introduction of selective flotation processes, approximately 0.5 net ton of 60° Be. acid was made for every net ton of new copper produced. As more and more of the other sulphides were separated from the copper sulphides, the production of acid from copper ores decreased. The total acid output of the industry, however, increased sharply. In 1941-1945 nearly one net ton of 60° Be. acid was made for every net ton of new copper, or twice as much as in World War I. Of this quantity, 0.3 net ton was obtained from copper concentrates and 0.7 net ton from pyrites recovered in the production of concentrates. It thus is evident that selective flotation has had a marked effect on the quantity of acid made by the copper industry. In fact, the current production of acid by the copper industry from pyrites flotation concentrates alone is more than enough to supply all the sulphuric acid used by the steel industry in this country.

Flotation Processes Lend Strength to Zinc Industry

Selective flotation also strengthened the position of the zinc industry in the sulphuric acid market. Zinc miners were quick to adopt these proc-

TABLE I

Copper and Sulphuric Acid Produced by U. S. Copper Industry (Net Tons)

Year	New[1] Copper	Sulphuric Acid 60° Be. — By-Product[2] Acid from Copper Plants	Sulphuric Acid 60° Be. — From Pyrites[3] Flotation Concentrates	Sulphuric Acid 60° Be. — Total
1913.....	612,867	336,019		336,019
1914.....	579,291	348,727		348,727
1915.....	711,849	360,522		360,522
1916.....	971,388	398,004		398,004
1917.....	961,277	427,646		427,646
1918.....	968,950	640,000		640,000
1919.....	604,807	364,991		364,991
1920.....	604,531	497,806		497,806
1921.....	252,793			
1922.....	425,143			
1923.....	717,500			
1924.....	817,125	354,592		354,592
1925.....	837,435	445,435	20,400	465,835
1926.....	869,811	416,792	69,400	486,192
1927.....	842,020	367,461	102,100	469,561
1928.....	912,950	439,500	163,600	603,100
1929.....	1,001,432	407,438	226,000	633,438
1930.....	697,194	357,602	294,100	651,702
1931.....	521,356	145,811	290,300	436,111
1932.....	272,005	141,094	117,900	258,994
1933.....	225,000	181,975	136,200	318,175
1934.....	244,227	168,676	302,200	470,876
1935.....	381,294	160,151	344,700	504,851
1936.....	611,410	226,738	329,400	556,138
1937.....	834,661	291,638	388,600	680,238
1938.....	562,328	220,297	341,300	561,597
1939.....	712,675	249,569	331,500	581,069
1940.....	909,084	254,025	442,200	696,225
1941.....	966,072	243,812	459,600	703,412
1942.....	1,087,991	265,522	546,000	811,522
1943.....	1,092,939	348,832	681,800	1,030,632
1944.....	1,003,379	320,572	725,600	1,046,172
1945.....		298,309	764,000	1,062,309

[1] Data from "Mineral Resources of the U. S." and "Minerals Yearbook."

[2] Data from "Mineral Resources of the U. S." and "Minerals Yearbook" as reported except 1925-1933, which are adjusted for part made from pyrites.

[3] Data based on production of pyrites in Tennessee and Montana as reported in "Minerals Yearbook," and estimated by the authors when not reported. Conversion of pyrites to acid: one unit of sulphur yields 3.8 units of 60° Be. acid. The estimated 17,100 net tons of acid made at Anaconda, Mont., in 1933 not reported by Bureau of Mines are included in these data.

esses as shown by the fact that the production of zinc flotation concentrates, exclusive of the Tri-State Districts, rose from 38,433 net tons in 1921 to 564,274 tons in 1929.[3] Because zinc concentrates have a high value, they often absorb comparatively high freight charges and are, therefore, shipped to smelters some distance from the mine. They also contain important quantities of sulphur so that it is not at all unusual to divert the smelter shipments to intermediate areas where the demand makes it economical to roast the ore and use the sulphur dioxide for the manufacture of sulphuric acid. Detailed data collected by the Bureau of Mines show the importance of zinc flotation concentrates to the sulphuric acid industry and how industry is able to use these concentrates in competition with other sulphur-bearing materials.

According to the data presented in Table II and Fig. 2, in which are shown the production of primary zinc and sulphuric acid from zinc concentrates or blende during 1913-1945, approximately one net ton of 60° Be. acid was made from every net ton of zinc produced, a ratio which has not varied greatly over the period. This is because zinc miners have always attempted to send to the smelters only high-grade sulphide ore. Ores containing pyrites, copper, lead and other sulphides were ordinarily not shipped because they caused difficulties in smelting operations. Furthermore, during the last 30 years, a large part of the blende used has always been roasted for its valuable sulphur content. The adoption of selective flotation processes by the zinc industry enabled the industry to produce high-grade concentrates from low-grade ores and thus increased domestic zinc supplies. It did not increase the quantity of acid made per ton of metal produced as was the case in the copper industry. At Balmat,[4] N. Y., high-grade zinc and pyrites flotation concentrates were made from an ore containing 20 per cent sphalerite and 24 per cent pyrite, the pyrites concentrates alone being equivalent to 30,000 gross tons of sulphur annually. With the value of the concentrates increased, they could be shipped greater distances and, therefore, could be brought into more active competition with other sulphur materials used in the production of sulphuric acid. Zinc roasters, because of the increased competitive value of zinc concentrates, made more secure their position in the sulphuric acid market. For instance, according to Kreps,[5] "By 1911 . . . zinc smelters were producing about 10 per cent of the total sulfuric acid sold in the United States. During the World War this percentage nearly doubled . . .

[3] "Mineral Resources of the United States," 1930, Part I, page 445.

TABLE II

U. S. Production of Primary Zinc and By-Product Sulphuric Acid at Zinc Plants[1] (Net Tons)

Year	Primary Zinc Produced by Smelters	60° Be. Sulphuric Acid Made from Zinc Blende
1913.....	358,262	296,298
1914.....	370,312	411,911
1915.....	507,142	565,440
1916.....	680,018	670,000
1917.....	682,411	790,000
1918.....	525,350	720,000
1919.....	471,684	446,518
1920.....	479,772	455,000
1921.....	215,614	
1922.....	373,678	
1923.....	531,202	
1924.....	535,846	520,361
1925.....	590,928	564,339
1926.....	618,422	595,700
1927.....	592,516	588,624
1928.....	602,581	558,377
1929.....	625,447	627,018
1930.....	498,045	536,614
1931.....	291,996	426,618
1932.....	207,148	341,340
1933.....	307,182	355,027
1934.....	363,590	406,984
1935.....	420,634	443,476
1936.....	492,132	505,882
1937.....	556,904	542,356
1938.....	446,341	466,879
1939.....	507,236	528,872
1940.....	675,275	586,912
1941.....	822,020	672,177
1942.....	891,872	695,242
1943.....	942,309	846,875
1944.....	869,302	804,010
1945.....		786,582

[1] Data from "Mineral Resources of the U. S." and "Minerals Yearbook." Acid made in 1916, 1917 and 1920 as reported included production from sulphur. Figures listed for these years are estimated on the basis that in 1924-1934, 0.96 net ton of acid was made from one net ton of blende.

Native sulphur from the Gulf Coast area supplies the major part of industry's requirements. Above, liquid sulphur from which air has been released flows into collecting stations or sumps

[4] U. S. Bureau of Mines, Information Circular 6574.

[5] Kreps, Theodore J., "The Economics of the Sulfuric Acid Industry," Stanford University Press, Stanford University, California, 1938, page 129.

TABLE III

U. S. Production of Pyrites (Gross Tons)

Year	Flotation Concentrates[1]	Other Production[2]	Total[3]
1913	0	341,338	341,338
1914	0	336,662	336,662
1915	0	394,124	394,124
1916	0	439,132	439,132
1917	0	482,662	482,662
1918	0	464,494	464,494
1919	0	420,647	420,647
1920	0	310,777	310,777
1921	0	157,118	157,118
1922	3,808	169,043	172,851
1923	9,007	181,628	190,635
1924	7,818	160,096	167,914
1925	23,561	170,081	193,642
1926	60,374	166,559	226,933
1927	87,040	215,786	302,826
1928	130,766	182,049	312,815
1929	169,101	164,364	333,465
1930	225,649	121,863	347,512
1931	226,269	104,579	330,848
1932	106,407	83,296	189,703
1933	118,766	165,545	284,311
1934	230,000	203,000	432,524
1935	276,000	238,000	514,192
1936	290,000	257,000	547,236
1937	337,000	247,000	584,166
1938	299,000	256,000	555,629
1939	295,000	224,000	519,497
1940	355,000	271,000	626,640
1941	371,000	274,000	645,257
1942	416,000	304,000	720,363
1943	513,000	289,000	802,384
1944	520,000	269,000	788,530
1945	535,000	188,000	722,596

[1] For the years 1922 to 1929, inclusive, the data refer to the production of pyrites concentrates in Tennessee and Wisconsin; "Minerals Yearbook," 1929, page 188. Production from 1930 to 1938, unpublished data from Bureau of Mines. Data from 1934 to date, estimated.
[2] "Other production" is the difference between "Total" and "Flotation Concentrates."
[3] Data from "Mineral Resources of the U. S." and "Minerals Yearbook."

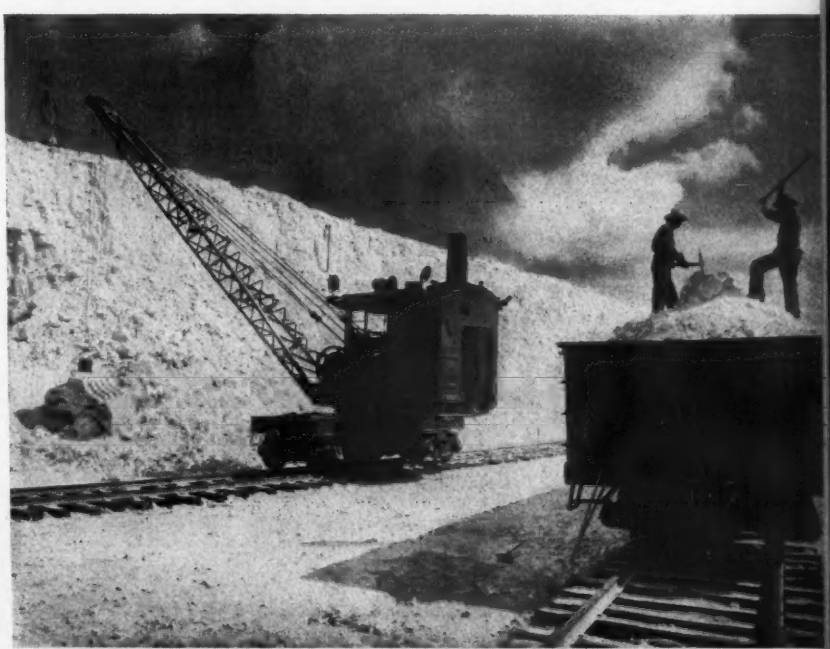
recorded production of pyrites flotation concentrates when 3,808 gross tons were produced as a by-product of zinc operations in Wisconsin. In 1925 pyrites concentrates were produced in Tennessee, in 1930 from zinc ores at Edwards, N. Y., and in 1939 from copper operations at Anaconda, Mont. All of these flotation operations were expanded under war conditions and it is estimated that 535,000 gross tons of pyrites flotation concentrates were produced in 1945, nearly three times the quantity of all the pyrites produced in the 1922-1925 period when selective flotation was introduced.

Data regarding the total "U. S. Production of Pyrites" are collected in Table III and Fig. 3. These show that there has been a consistent growth in the production of pyrites concentrates. The production of pyrite ore, both lump and fines, indicated as "Other Production" in the table, has not kept pace with this growth. No new major mining areas have been developed and production which amounted to less than 200,000 gross tons in 1921-1923 reached only 300,000 gross tons during the recent war period. The total domestic production of pyrites, however, has been continually increasing and during the war period reached an all-time high of 802,384 gross tons. Selective flotation thus did much to expand the production of domestic pyrites and to make available to acid manufacturers an increasing domestic supply of this sulphur-bearing material.

and the tonnage in 1917 was nearly four times that of 1911. Inasmuch as the tonnage of zinc produced increased only twofold, it is clear that zinc manufacturers were increasing their production of sulfuric acid by adding pyrites or sulfur to their smelting ores or by otherwise enriching the roaster gases." Comparable data are not available for later periods but in recent times zinc manufacturers have similarly augmented their production of acid through the use of sulphur and thus have maintained their position in the sulphuric acid market.

Selective Flotation Expands Domestic Pyrite Industry

Originally all domestic pyrite was obtained from pyrite mines or as a by-product in the mining of coal. Production during the 1913-1921 period averaged about 400,000 gross tons a year and during this time the total apparent domestic consumption averaged about 1,000,000 gross tons a year. The greater portion of the pyrite used came from foreign sources. In 1922 we have the first



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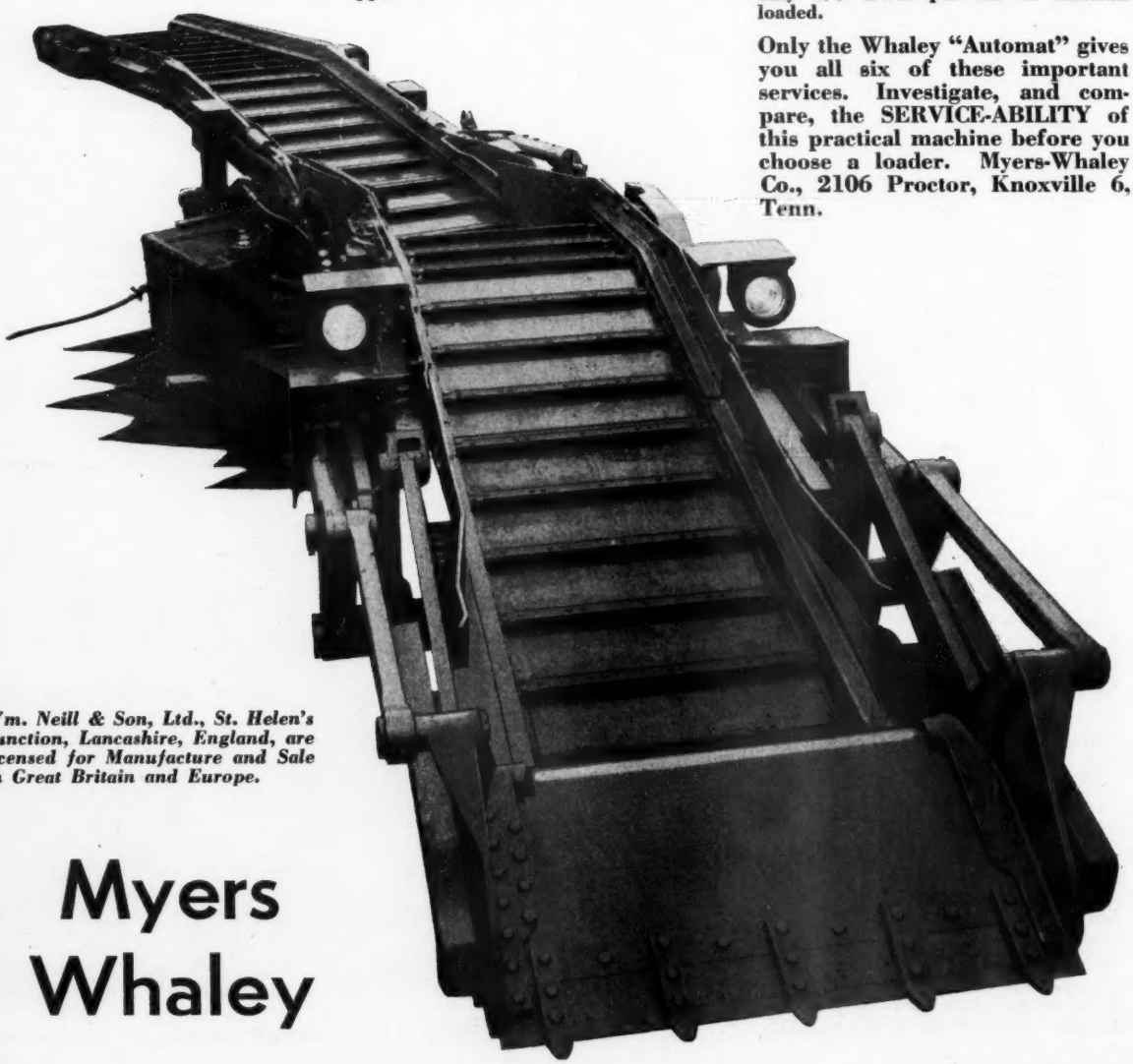

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Pillar Recovery In Thin Seam Mining

THIS IS A COAL DIVISION REPORT

A Continuation of the Preliminary Study Being Made by the Committee on Roof Action

PILLAR mining is a controversial subject within the coal industry but this is altogether natural because there are many different factors involved. First comes the question of the practicability of the pillar removal—that is from a roof action standpoint; then, if the physical removal can be made at a reasonable operating cost, there are some economic questions to be decided, such as a damage to the surface and the quality of the coal produced from the pillars. The change from hand to mechanical mining did not settle any points in this controversy but since everything else hinges on the practicability of recovery, the study of the committee, for the time being, will be confined to that phase of the problem.

Successful operations early demonstrated that loading machines were economically adaptable to entry and room work but there remained considerable doubt in the minds of many, as to how far mechanization could be employed on properties where a high percentage of coal recovery was a lease specification. It immediately was obvious that a machine did not mine coal in exactly the same way as it had been mined by a man and because pillar drawing called for a high degree of skill on the part of the workmen, it was felt that a machine could not be adapted to this operation. This idea is still being debated although a technique for mechanical pillar extraction has been developed and there are quite a number of companies, who today are successfully taking pillars with mobile loading machines. Some typical examples were cited in the Coal Division Report published in September MINING CONGRESS JOURNAL and a further account is given in Mine D, presented in this issue.

The development of conveyor mining followed entirely different plans from those of the loading machine and the majority of the first conveyor installations were made in what was then considered low coal—that is seams less than 4 ft. In these fields, a high rate of extraction was compulsory so it necessarily followed that pillar recovery became an integral part of the technique developed for conveyors. In the very beginning, there were a number of attempts made to use longwall but for the most part these were not successful as the roof support was found too costly for the average commercial mine. So of necessity, companies using conveyors went to the standard room-and-pillar system, making such modifications as were needed to suit conveyor operation.

The greatest change from hand practice consisted of taking multiple cuts in a working face during a shift. This concentrated the production into a relatively small area, which turned out to be quite an advantage from two standpoints—it reduced the size of the territory for a given tonnage and the fast rate of extraction gave a favorable roof action for pillar recovery. All of which proved highly satisfactory and since those early beginnings, there have been hundreds of acres of coal mined with conveyors that have made as high a percentage of extraction as was formerly made with hand loading. In fact, pillar recovery with conveyors is now routine and several samples are submitted with this report to illustrate typical operations and normal recoveries.

While all room and pillar systems essentially follow the same basic idea, there are of course many modifications to suit conditions encountered locally—mainly roof conditions, as the roof action is the factor which determines what plan of extraction can be used. Dimensions of the rooms and the pillars, the number of places worked as a unit, are matters to be decided at each mine and there is naturally a wide variance in the selections. However, there seems to be one point of agreement—no one actually attempts a 100 per cent recovery. Experience has shown that small coal pillars (less than 10 per cent loss) left in place as roof supports for a retreating working face, are more effective than cribs or heavy timbers as a breaker line and the value of this

Successful roof action is essential for high recovery

unmined coal is far less than the cost of providing artificial supports. This point is brought out in the following account that has been submitted to the committee by an operating company.

Report on Mine A

For several years we have worked chain conveyors with hand loading in coal seams which are too low to allow complete recovery theoretically. In order to minimize the coal left standing and to have an orderly roof subsidence it has been our effort to leave a uniform amount of coal carefully planned and watched. Accordingly we have narrowed the entry centers to give about 18 ft. in the chain pillars, and rooms on 60 ft. centers are driven 50 ft. or 52 ft. wide with cross-cuts between the rooms on 80 ft. centers. Where the roof subsidence tends to follow too closely and close up on the immediate inbye room, the cross-cuts between the active room and the abandoned one are narrowed down so as to just hole through; conversely, where the subsidence lags behind sufficiently, these cross-cuts are made wider.

In most instances we mine the rooms advancing on one side of the entry as it is developed and retreat on the opposite side. Obviously this means that the rooms on one side drive toward abandoned areas and on the other side advance in solid coal. Because this is subsidence mining, the top does not break and weight is usually encountered in the last 30 ft. or 40 ft. of the room approaching the abandoned area; accordingly this room advances slower than the one going in the opposite direction in the solid coal. To meet this situation it has become routine with us to specify, when working toward the gob, a room conveyor length of 45 pans plus the head and tail pieces, while in driving toward the solid coal the conveyor has 55 pans plus the head and tail. Further, because the top remains good in the room going toward solid coal, we usually remove all the coal after passing the last cross-cut and the 10-ft. pillar which is left ordinarily between the active room and the inbye abandoned one is removed for the last 80 or 90 ft.

In one case, we kept accurate record of the tonnage produced from an entry from the date of its beginning development until the last room had been exhausted; the resultant figures showed that 86 per cent of the total theoretical coal had been recovered. However, this figure may be varied by the top condition encountered, for in almost every case the rooms will be driven slightly wider when the roof acts as hoped, while if the top is subsiding fast and crowding the work, the tendency is to narrow the places, thus cutting down the recovery from the area. From experience of a good many years of measuring extracted areas and making reports to lessors, etc., it is our belief that a method such as described will give the same total recovery as we were able to obtain in the past by hand loading from rooms and pillars where the plan was to recover 100 per cent of the coal.

In two of our mines where we attempted this system, the subsidence continually crowded the active work with a tendency to close up the room immediately inbye the active one. In these cases we have developed, and are using, a method of driving two narrow places instead of one wide room and winging back on both sides of one of these rooms so as to take out 120 ft. The cross-cuts are driven through the chain pillar on 60-ft. centers as would be done on the first described method and where the conditions make it necessary we move back the regular 60-ft. distance for one of these narrow rooms placing the other one on 30-ft. centers. Both of these rooms drive up narrow and retreat out with 100 per cent recovered from

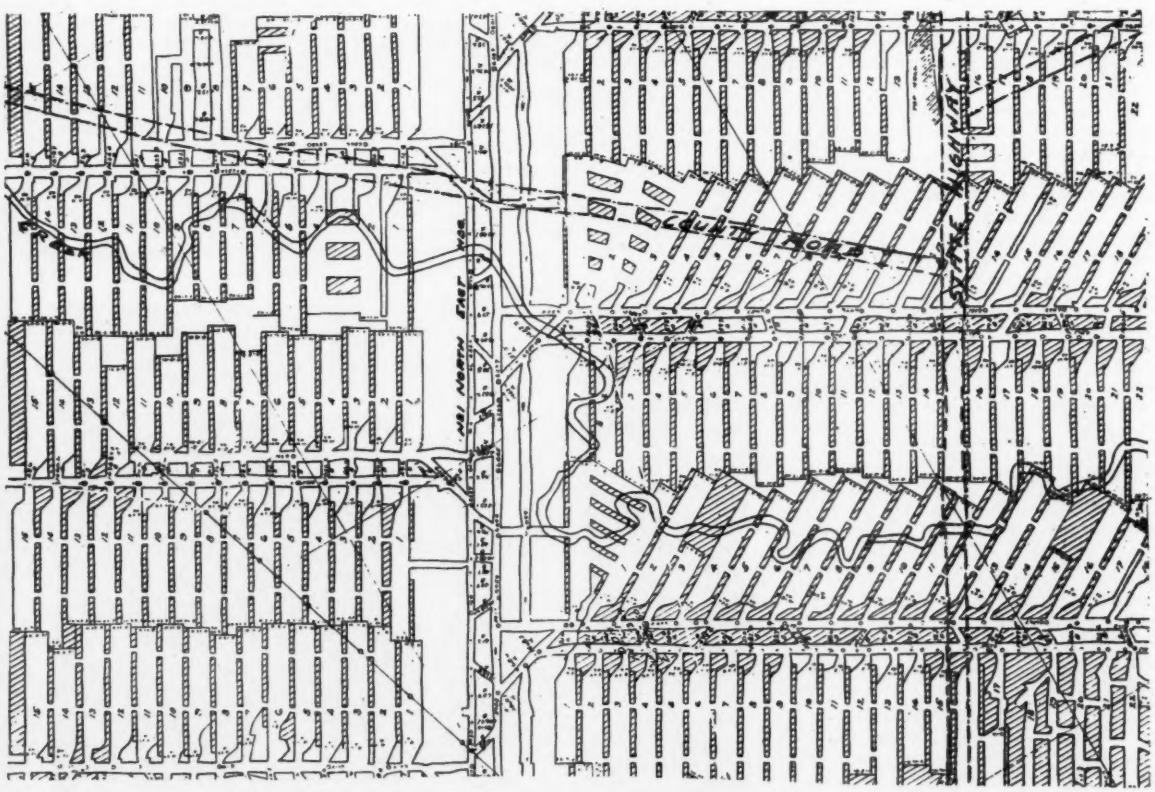


Fig. 1. High recovery with thin pillars left unmined

the pillars. The costs from this method are not as good as with the regular system as more equipment is involved for a little less tonnage and crews are constantly switched from wide work to narrow work and back again. However, we have found it possible to control the top by following this procedure every five or six rooms. In other words we will retreat five wide rooms and when we observe the top beginning to catch the work, we will then put in the two narrow rooms and completely extract 120 ft. which seems to allow the top and bottom to come together quickly and slow up the creeping toward active work.

Other than the method described above I have never found it possible to use conveyors in pillar work and I have tried several layouts. It is my conclusion that where the top can be controlled, the coal lost to provide proper roof subsidence has considerably less value than the increased costs would amount to where complete recovery is attempted in conveyor work.

Report on Mine B

This mine is in a seam of which 34 in. is recovered as merchantable coal. The operation is entirely by hand loading on conveyors; the equipment consists of chain flight conveyors—room, face and entry types, shortwall cutting machines, slow speed hoists, and electric coal drills. The haulage is by mine car and locomotives to the shaft, which is about 300 ft. deep.

The general mining method is to drive the main headings and butt headings one at a time, which gives a chance to brush the parallel heading while the coal is being removed. The rooms are driven 40 ft. wide on 50 ft. centers, leaving a narrow pillar which is removed coming back by slabbing. In most cases the 7-ft. cut will break through to the adjacent room.

Fig. 1 illustrates a typical section of the mine and shows the recovery where the cover is roughly 400 ft. Within the room area of a panel, a 90 per cent extraction is usually secured but if for one reason or another, the chain pillars and room stumps are allowed to remain in the butt headings, the recovery is reduced to 83 per cent. If the overburden is sufficient, it is not necessary to leave pillars for surface protection (note highway, country road and stream) but in some cases small pillars are allowed to remain because of clay veins and for protection against water.

Where track is to be installed, the machine cuts on the extreme bottom of the seam in dirty coal, while in all rooms, break throughs and air courses, the cut is made in the so-called upper binder above the 34-in. section. In all cases, the cuttings are either gobbed or loaded out as refuse and, except where the top bony breaks into small pieces, the top bone is not taken down until after the coal is loaded onto conveyors. In driving the track headings, the coal is shot down and the merchantable portion loaded before any bottom scrapping is done.

Report on Mine C

This mine, a section of which is illustrated in Fig. 2, works a seam 3 ft. 8 in. in height, was operated entirely with hand loading on chain conveyors which takes the coal to a trip of mine cars on the entry. As shown on the map the mining in this section was very complete and it will be noted that the main barrier pillars have been extracted.

A conventional conveyor mining plan was used; two or more rooms, each about 30 ft. wide and having pillars of about that same thickness between, were worked off one side of the entry driving to a length of 300 ft. As soon as the room reached its limit the pillar was brought back immediately, either by open end cuts or by cross cuts, as the roof permitted. An excellent recovery was made as explained by the following statement submitted by the management:

"We figured an 85 per cent recovery. From observations made during the mining, of how the pillars were drawn and what stumps were left in, my opinion is that this figure is conservative and that our recovery was nearly 90 per cent where we were not intentionally leaving pillars for protection."

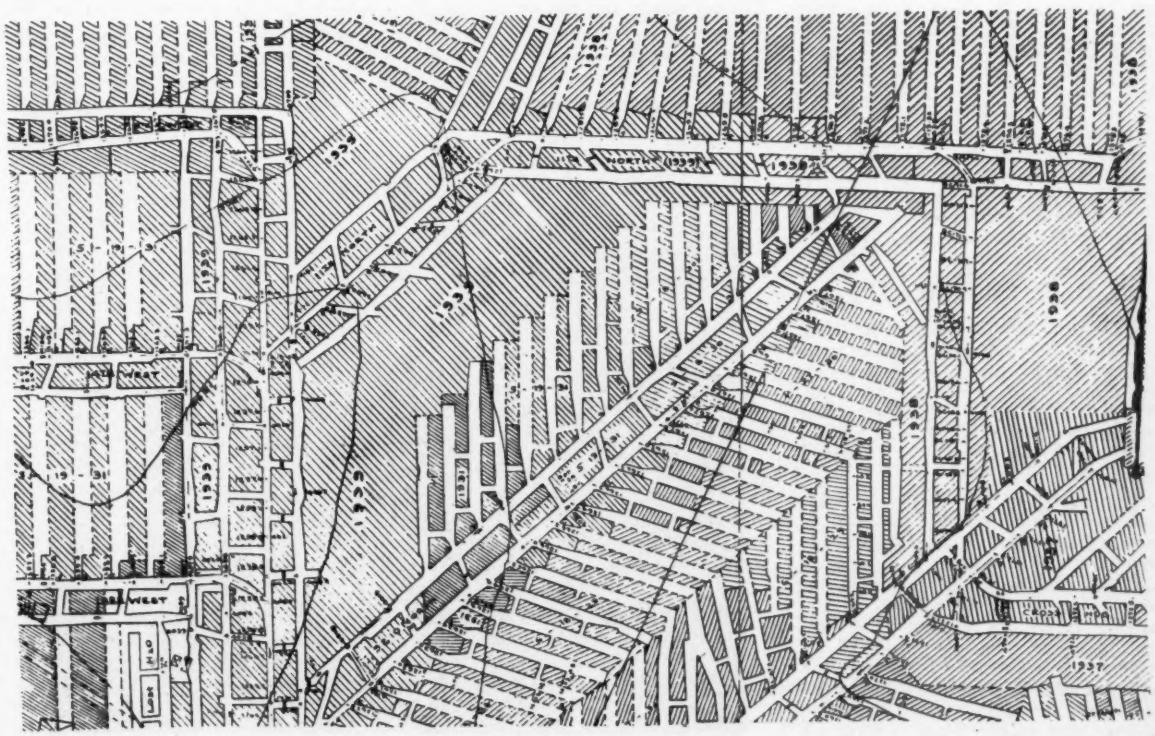


Fig. 2. Wide pillars recovered by cross cuts

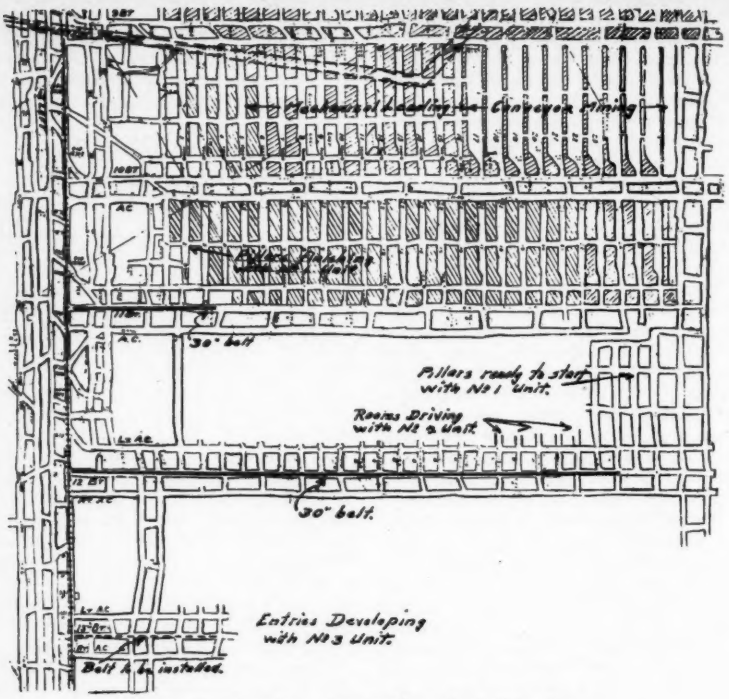

Mechanical Loading Conveyor Mining
30" belt
Pillars ready to start with No 1 Unit.
Rooms Driving with No 2 Unit.
30" belt.
Entries Developing with No 3 Unit.
Belt to be installed.

Fig. 3. Complete mining with mechanical loading

Cover varied from 90 ft. to 350 ft. and no surface caves were ever seen even at the minimum cover. However, springs naturally lost their water. Immediately over the seam was about 10 ft. of dark slate then about 5 ft. of sandstone and limestone; above that was 30 ft. of gray shale. Roof over the coal was good but pillars had to be taken as clean as possible or weight would ride and adjoining places would heave and squeeze. About two or three falls would take place in each room as the pillar was drawn back and apparently the limestone would break as "milky" water would run from new caves.

Report on Mine D

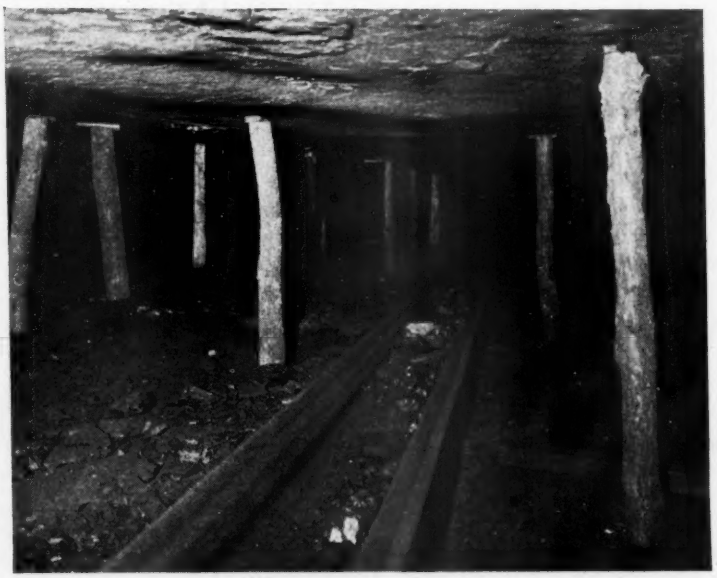
This mine is in a seam 43 to 45 in. in height; the roof is sometimes good and sometimes there is as much as an additional 12 to 14 in. of draw slate. If the top is wet, this draw slate breaks into small pieces and is very difficult to handle. The average overburden is 380 ft.

The operation was originally with conveyors but recently changed to mobile mechanical loading; the transition point is shown on No. 10 Butt and now tractor loaders with shuttle cars are used for all mining in the entries, rooms and pillars. The system is to drive rooms about 20 ft. wide and 50 ft. centers; a 30-ft. pillar which is usually about 80 ft. between cross-cuts is taken out in two lifts of four cuts each. When possible all four cuts are removed in the same day of two shifts, and the percentage of recovery is about 90 per cent of the rooms and pillars.

There are three mechanical loading units; one developing entries, one driving rooms and one extracting pillars. Each unit consists of one shortwall cutting machine transported by a caterpillar truck, a low type tractor mechanical loader, one cable reel shuttle car and one electric drill. The shuttles transport from the face to the entry belt, loading on the end of the belt as well as at every other room neck; a slight ramp and bank board is required when the shuttle loads over the side. The belt extends from the working section of the entry to the mine car haulage which goes to the shaft.

The general plan of mining is shown in Fig. 3. One unit drives three butt headings and necks the rooms on one side. After the headings have been driven to the top of the panel, the rooms are started retreating and when several of the rooms have been driven to their length, a second loading unit is added to the panel to operate on the room pillars. The first unit continues driving the solid place which gives a continuous retreat coming back on a 45-degree angle.

In this manner the units are rotated between the development, room work and pillar extraction to secure a balanced system. This is illustrated in Fig. 3 where No. 11 butt is finishing the pillars and its equipment is about to be moved to No. 12 which has completed the top rooms and is ready for the addition of the second unit. No. 13 is the first portion of a set of butt headings driven to a position where the belt will be installed; up to this point the shuttle cars loaded directly into mine cars on the main haulage way.



Conveyors are especially adaptable to pillar mining

WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

CONTROVERSIES over matters of international policy between high-ranking officials of the Administration marked an otherwise quiet September in Washington. Much conjecture centered on the political campaign which will climax in the election November 5. Opinion appears to hold that chances are about 50-50 for the majority and minority parties in the campaign battle to control the House and the Senate.

Speaking before a bankers' convention, Treasury Secretary John Snyder stated that maintenance of present tax levels is inescapable, "if we are to achieve a balanced budget and a surplus to be used to reduce the public debt," and that "it is pure fantasy, if not plain demagogy, to talk of tax reduction and debt reduction in the same breath." While no definite statements on tax policy have been forthcoming from congressional sources, it is known that the staff of congressional tax specialists has been conferring with Treasury officials and that tentative drafts of tax legislation for 1947 are being prepared.

OPA Operation

The revived OPA has carried on by issuing numerous orders, regulations and announcements pertaining to decontrols, pricing and the appointment and functioning of Industry Advisory Committees. Decontrol appears to be largely a matter of whether the product under consideration is in ample supply and whether continuous control would be a greater administrative burden than a contribution to the stabilization program.

Decontrol and price relief are both predicated on representations required to be made by Industry Advisory Committees. Before any price increase is granted under the new law, the Barkley amendment requires OPA to study producers', processors', and manufacturers' average prices during 1940 and to add to them the average increases in costs since that time to determine the ceiling price. It is also required that OPA ascertain the cost "of a reasonable number of producers, manufacturers or processors" in the process of determining the ceiling.

Under OPA's regulations, an Industry Advisory Committee may petition for a price increase if current OPA price ceilings do not allow (1) average dollar price of a product in 1940 (calendar or fiscal year) plus the average increase in production costs since 1940; or (2) current average costs plus the industry's average overall percentage profits on sales in 1940, if this be lower; or (3) current average costs plus a "reasonable" profit, if output and use of the product could not be substantially increased without curtailing the production of another product equally needed.

Delay of 100 days or more in getting action on price relief may occur under OPA regulations. An Industry Advisory Committee must give OPA 10 days' notice of any proposed meeting; next OPA is given 60 days to study the petition and to either increase the ceiling price or deny the application; if no action is taken within the 60 days the Industry Advisory Committee may petition the Emergency Court of Appeals for relief, and the Court has an additional 30 days in which to require OPA to adjust prices or deny the application.

Experiences of a number of producers who have endeavored to secure price relief under the Barkley amendment indicates that it is a hopeless quest.

Producers of lead have endeavored to secure OPA approval of an Industry Advisory Committee since shortly after the extension of the Act was approved by the President, but thus far to no avail. OPA officials have stated that no increase in the current ceiling price of lead "is planned in the foreseeable future"; they have indicated "strong doubt" that any price increase will be made on copper; and though it has been stated that a study is being made of zinc data, no indication has been forthcoming as to when any action on a ceiling price increase may be taken.

Washington Highlights

TAXES: No cuts in sight (?).

WPA: Price relief and decontrols bogged down.

PREMIUMS: Steelman announces "exploration premiums."

SILVER: Monetary Fund Board approves study.

GOLD: Treasury states value will remain at $35.

STOCKPILING: Administration of law goes forward.

COAL: Wage contract negotiations indefinitely postponed.

SUPERVISORS: Unionization issue in courts.

FREIGHT RATES: ICC decision due in December.

Exploration Premiums

Carrying out the provisions of the McFarland amendment to the OPA Extension Act, the Office of Economic Stabilization on September 14 issued Directive 137, authorizing a new and separate class of premium payments to encourage exploration for copper, lead and zinc and providing for adequate allowances for development work, depreciation and depletion. OPA, CPA, RFC, and the Quota Committee are charged with carrying out the provisions of the Directive.

For mines producing less than 600 tons of copper, lead or zinc in the 12 months ending June 30, 1946, the premium is 1 cent per pound of metal produced, but for larger properties exploration premiums are to be assigned only for specific projects which must be fully justified by detailed substantiating data. Exploration is defined as the "search for ore other than the 'normal' development of the property on the production from which exploration premiums are to be paid." The money may be spent in searching for ore by any recognized

method; on purchase or rental of necessary equipment; on overhead charges equitably allocated to the exploration operation; and on sampling, assaying, engineering, and geological costs related to the project.

Development work is to be encouraged by the addition of not to exceed 20 per cent of the normal development cost in all Quota Committee calculations. "Normal" development is defined as "that type of work (which) delineates known or near-by ore bodies and prepares them for mining, ordinarily carried in company accounts as an operating, non-capitalizable cost, and which is prosecuted at a rate such that it will develop 1 ton of ore for each ton mined."

In providing an adequate allowance for depreciation in the calculation of operating margins, allowances for mine plants are provided as follows: Complex ores, 10c a ton; simple lead or zinc ores, 7c; Tri-State type ores, 5c; and copper ores, 0.1c a pound for copper.

For depletion provision is made that, to the allowances now made for mine ownership in lieu of depletion (50 per cent of the basic margin calculated for the mine), there shall be added 25 per cent of the net smelter return for each metal, other than copper, lead and zinc, contained in his products for which payment is made to the producer by the processing plant.

Silver

It is needless to say that enactment of the Murdock-Martin Silver Act, discussed in our September issue, met with enthusiasm in the silver-producing countries of North and South America. In particular the Ambassador of Mexico in Washington expressed the approval of his government. Demonstrating the increased interest in silver, stimulated by the rise in price, he submitted a resolution to the Board of Governors of the International Monetary Fund, now closing its first session in Washington.

This resolution, which was unanimously adopted by the Board, recalled that the conference at Bretton Woods, N. H., agreed that the subject of silver merited further study by the interested nations. It states that several of the Fund's member countries may wish to use silver to bring about necessary fiscal and monetary reforms, as well as in making other essential economic adjustments. The resolution accordingly provides for the gathering of "whatever material is available and obtainable on the monetary uses of silver; the real function of silver coin; risks and uncertainties of its monetary uses; possibilities of cooperation in the use of silver for monetary purposes, etc. In general, the Fund shall gather material, statistical or otherwise, which could be useful in facilitating discussions on the subject in an international conference among interested member countries."

As the result of the approval of this resolution it is believed that a Silver Conference will be called, probably in Mexico City, in the course of the late winter or spring months, at which representatives of the nations of the world interested in silver will be present.

Gold Dollar

John W. Snyder, Secretary of the Treasury, has recently stated to the Manager of the International Monetary Fund that the par value of the American dollar will remain $35 per ounce of gold. This announcement is important because the Bretton Woods agreement, under which the International Monetary Fund operates, provides that a nation which has officially stated the par value of its currency for purposes of the Fund may not change this par value except to correct a "fundamental disequilibrium." The Agreement further states that any change of more than 10 per cent in the par value of a nation's currency requires the concurrence of those participating in the operation of the Fund.

Representatives of the United Kingdom inquired whether "unemployment of a chronic or persistent character," arising from pressure on its balance of payment, would be considered "a fundamental disequilibrium." The Directors of the Monetary Fund decided that such a condition would be so considered but they reserved the right to decide whether any revision in the par value of a currency would be necessary in order to promote full employment. The Directors are reported to believe that such an interpretation will prevent unregulated variations in exchange rates.

Stockpiling

The Army-Navy Munitions Board and the Procurement Division of the Treasury are proceeding in an orderly manner to carry out the provisions of the Strategic and Critical Materials Stockpiling Act, approved by the President July 23. In addressing the Western Division Metal Mining Convention of the American Mining Congress at Denver, September 10, Col. O. O. Niergarth, of the Army-Navy Munitions Board, referred to the modest appropriation of $100 million granted by Congress for the present fiscal year, and stated that reconsideration of the appropriation will be asked when the Eightieth Congress convenes. Niergarth quoted the following recent statement of Richard R. Dupree, Chairman of the Army and Navy Munitions Board:

"It will be the policy of this Board to procure these materials in a systematic and orderly manner, mindful of the economy of our own and other countries. The fact that this stockpile will be accumulated over a period of time gives us considerable leeway in the procurement of materials so that there should be little, if any, disruption to our own domestic economy. The Board will be very mindful of that situation. There will be no hard and fast rules regarding the acquisition of any given material. Naturally, our objective is a balanced stockpile to be obtained in an orderly fashion."

The Senate Committee to Investigate National Defense, originally known as the Truman Committee, has recommended in its fifth annual report that the program for the future defense of the nation should emphasize the stockpiling of raw materials and plans for quick industrial mobilization. It was urged that the Stockpiling Act be translated into action and that "war settlements, including the sale of surplus property in foreign areas, as well as anti-trust, patents and other Government policies, should be coordinated for the purpose of adequately protecting our sources of raw materials here and abroad."

Coal Contract Discussion

Contract negotiations between the Bituminous Coal Operators Negotiating Committee and UMWA representatives, who met in Washington September 10 at the request of Coal Mines Administrator Moreell, were recessed indefinitely September 13. While the northern operators agreed to consider a basic framework submitted by Admiral Moreell, definite objection was made to giving mine safety committees authority to remove employes from mines "where the committee believes an immediate danger exists." The southern operators opposed inclusion of a mandatory Federal safety code in the wage agreement. They rejected the inclusion of "royalty" on coal production as included in the Krug-Lewis Agreement, offering instead to set up a jointly administered labor - management fund to care for cases of hardship amongst miners and their families. Likewise rejected was the setting of a percentage limitation on the number of supervisory employes at the mines.

Admiral Moreell had proposed that the joint conference consider a modified version of the Krug-Lewis Agreement including proposals that the contract run to April 1, 1948; that the Federal Mine Safety Code be revised from time to time with enforcement a matter of contract obligation; that employes be given the protection of workmen's compensation and occu-

(*Continued on page* 109)

Personals

D. M. Kelly, vice president in charge of Western operations for the Anaconda Copper Mining Company, has been granted retirement at his own request because of ill health. He will, however, maintain offices at the company's headquarters in Butte as administrative consultant. Mr. Kelly terminates 31 years of active service and has had an outstanding career in the mining industry. In 1915, Mr. Kelly, who was at that time attorney general of Montana, resigned to join the legal staff of the Anaconda company. In 1931, he became Western general counsel and during the same year was named vice president in charge of Western operations, succeeding J. R. Hobbins, who is now president of the Anaconda company.

D. M. Kelly

Mr. Kelly is being succeeded by **E. S. McGlone**, who has been actively engaged in mining operations with the Anaconda company for 22 years. Mr. McGlone graduated in 1923 from the Colorado School of Mines where he had shown great prowess on the football and baseball fields. Taking a job in Butte with the Davis-Daly Mining Company he continued to star on the famous semi-pro teams of those days. In January, 1929, he started as a miner and sampler at the Tramway Mine of the Anaconda company, and was promoted successively to shift boss, assistant foreman, assistant general superintendent, and in 1940 to the position of general superintendent of mines. In 1943 he was appointed general manager of mining and metallurgical operations for the company in Montana and Idaho, and in 1945 to the post of general manager of Western mining and metallurgical operations.

E. S. McGlone

As vice president in charge of Western operations for the Anaconda company, Mr. McGlone is one of the youngest major executives in the mining industry today.

B. Helme Stockett, general manager of the Locust Coal Co. at Shenandoah, Pa., a subsidiary of Weston Dodson & Co., Inc., has retired as a result of ill health that has kept him confined to his home in Pottsville. **Joseph J. Crane** has succeeded Mr. Stockett as general manager.

The appointment of **Ernest V. Haines** as head of the newly-created patent department of International Minerals and Chemical Corp. has been announced by **Louis Ware**, president of the company. Mr. Haines will work at the Chicago headquarters of the company under **Dr. Paul D. V. Manning**, vice president in charge of the research division, and will handle all details relating to patent developments for the corporation.

John H. Melvin, for the past six years geologist with the Pennsylvania Drilling Co., Pittsburgh, Pa., is now district geologist, U. S. Engineer Office, Omaha, Nebr.

Howard E. Lohmann, treasurer of the Ayrshire Patoka Collieries Corp., was elected secretary of the Indianapolis Control of the Controllers Institute of America. The Institute is a technical and professional organization of controllers devoted to the improvement of controllership procedure.

Howard I. Young, president of the American Zinc, Lead and Smelting Co., anonunced that the board of directors of the firm has accepted the resignation of **Alfred W. Dodd**, vice president, to become effective October 1, 1946. Mr. Dodd has been connected with the American Zinc, Lead and Smelting Co. and its subsidiaries during the past 30 years. He served in the capacity of eastern manager of sales, vice president and director. Before joining the organization, Mr. Dodd was connected with the New Jersey Zinc Co. for 19 years, and for a short time with the Granby Mining and Smelting Co.

William R. Chedsey has been appointed professor of mining engineering in the Department of Mining and Metallurgical Engineering at the University of Illinois. Dr. Chedsey graduated from the Colorado School of Mines in 1908 and received the Doctor of Engineering degree in 1938. Dr. Chedsey has had a distinguished career in mining operations and mining education. He has been on the staff of Colorado School of Mines, University of Idaho, professor of mining engineering at Pennsylvania State College, director of Missouri School of Mines and Metallurgy, and Missouri State Mining Experiment Station, 1937-1941. He was formerly chairman of the AIME Mineral Industries Education Division in 1940 and 1941 and president of the Coal Mining Institute of America in 1937.

Armstrong R. Matthews has been elected president of the Clinchfield Coal Corporation and also of the Davis Coal and Coke Company. Mr. Matthews succeeds Dr. Huston St. Clair, who recently resigned from the presidency of these two companies to devote his entire time to his own interests. Dr. St. Clair is president of the Jewell Ridge Coal Corporation and connected with several other business institutions in southern West Virginia.

E. G. Carroll, Hibbing, Minn., chief inspector of the eastern Mesabi iron range for the Great Northern Iron Ore Properties, retired on October 1.

Lewis H. Ripley has been promoted to general superintendent of the Revlos Monroe Coal Mining Co. to succeed **L. F. Crouse**, who has retired. Mr. Ripley was former superintendent of operations.

W. J. Harshaw, Cleveland, Ohio, has been elected to the board of directors of the Calumet and Hecla Consolidated Copper Co. Mr. Harshaw is vice president of the Lake Chemical Co., a firm in which Calumet and Hecla is participating as a part owner. Mr. Harshaw succeeds the late **George S. Mumford** on the board of directors.

C. Millard Dodson has been elected president of Weston Dodson & Co., Inc., to succeed his uncle, the late **Alan C. Dodson**, it was announced early in September. The new president has been with the company since 1931 and has served in all branches of the business. He is the son of the late **Truman M. Dodson** and is the fourth president of the firm.

John Durfee, formerly research engineer with the M. A. Hanna Co., on the Mesabi iron range of Minnesota, is now with the Frick Coke Co. in Pennsylvania.

R. E. Sansom, formerly of Joplin, has been promoted to the position of manager of the crushed-stone operations of the American Zinc, Lead & Smelting Co., including two subsidiaries of the parent company which are the American Limestone Co. and the Watagua Stone Co., with headquarters at Knoxville, Tenn.

The appointment of **Prof. R. Z. Williams**, chairman of the Mechanics Department at the Missouri School of Mines, as assistant dean of that school has been announced by **Dr. Frederick A. Middlebush**, president of the University of Missouri. The appointment was made at the recommendation of Dean Curtis L. Wilson, and was made necessary by the greatly increased enrollment expected at the School of Mines this fall.

R. Z. Williams

Hugo C. Nyquist has been appointed district manager of the anthracite area for the Joy Manufacturing Co. at Scranton, Pa. Mr. Nyquist has been connected with the Tennessee Coal, Iron & RR. Co. since 1937, serving as chief engineer of the Coal Division for the past several years. For 10 years prior to that he was with the Hudson Coal Co. Mr. Nyquist will make his headquarters with the Joy Manufacturing Co., 125 Adams Ave., Scranton, Pa.

Frank C. Hout, of Ebensburg, has been named manager of the J. H. Weaver Co. coal mines in Pennsylvania and West Virginia. **Jerome C. White**, also of Ebensburg, was named assistant vice president and **Howard Schwenebraten**, Nanty Glo, was appointed general superintendent of Heisley Coal Co. at Nanty Glo.

A. H. Zeilinger has been named a member of the Governor of Colorado's Committee on Safety. Mr. Zeilinger is safety director for the Colorado Fuel & Iron Corp., at Pueblo, Colo.

E. J. McGehee was recently appointed sales manager of Koppers Co., Inc., as announced by **General Brehon Somervell**, Koppers, president. Mr. McGehee, who is a vice president of the company, in his new capacity will coordinate Koppers sales activities on a company-wide basis.

— *Obituaries* —

Walter Douglas, president of the Phelps Dodge Corporation from 1917 to 1930 and formerly president of the American Mining Congress, who was associated with many business and philanthropic organizations, died October 3 in his 76th year at his home, Chauncey, N. Y., after a brief illness. He had retired from active business and spent part of his time at his place in Phoenix, Ariz.

From 1910 to 1917, Mr. Douglas was general manager of the Phelps Dodge Corporation, from which position he subsequently rose to become president.

His business career began in 1890 as an engineer with the Commercial Mining Company, Prescott, Ariz., a Phelps Dodge enterprise. Later, he became metallurgist for the Consolidated Kansas City Smelting & Refining Company. In 1894, he was appointed chemist of the Copper Queen Consolidated Mining Company, a predecessor of Phelps Dodge. In 1895, he served on the staff of the Detroit Copper Company, in which Phelps Dodge had a substantial interest, and in 1899 became superintendent of the Copper Queen Consolidated Mining Company. He was appointed general manager of Phelps Dodge and Company in 1902 and served in this capacity until 1910 when he became general manager of the Phelps Dodge Corporation.

He was born in 1870 in the city of Quebec, Canada, and became a naturalized citizen of the United States in 1913. He was educated at Upper Canada College, Morrin College and the Royal Military College of Canada and later at the Columbia School of Mines, in New York City.

Maurice E. Clark, 88-year-old pioneer in Southwestern mining circles, died in an El Paso, Tex., hospital August 18, following a short illness. Mr. Clark, with **John Hayes Hammond**, was one of the pioneer silver miners in Tombstone, Ariz. Despite his retirement from active mining 15 years ago, Mr. Clark had retained an option on mines in the Organ Mountains, and had an interest in the Hilltop Mines, 75 miles north from Douglas, Ariz.

James Verner Claypool died in Duluth, September 14, from complication following an appendectomy, at the age of 59. Mr. Claypool was industrial relations manager for the Oliver Iron Mining Company. He was born in Duluth and his entire life work was devoted to iron mining on the Mesabi range. In 1910 he was appointed mining engineer for the Oliver Iron Mining Company and was made assistant superintendent of the company's properties at Chisholm in 1921. By 1930 he was assistant superintendent of the Hull-Rust mine and in 1938 he was transfered to the Duluth offices, where he became assistant manager of the industrial relations department. He was appointed department manager in 1942.

Charles N. McNulty died on September 6 at the Long Island College Hospital after an illness of several months. Mr. McNulty joined the staff of the Texas Gulf Sulphur Co. in 1920 upon his return from France, where he served in the infantry during World War I. Prior to his service in the Army he had been employed in the Traffic Department of the Southern Railway.

James E. Jopling, a resident of Marquette, Mich., for 66 years, died recently at his home following an illness of more than two years. At the time of his death, Mr. Jopling was 84 years of age and was one of the few surviving pioneers of the iron range.

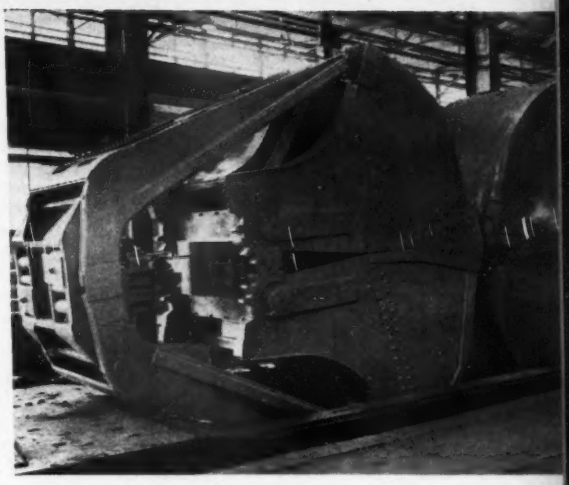
Surveyor, explorer and mining engineer, Mr. Jopling was amongst those who discovered and developed the iron deposits in the Upper Peninsula. He came to the United States in 1881 and served as mining engineer and consultant until his retirement several years ago. He was chief mining engineer for the Cleveland-Cliffs Iron Company from 1895 to 1927.

Walter M. Evered of Duluth, retired, died September 7 at the age of 73. Mr. Evered was long connected with the National Iron Company of Duluth and served as treasurer and president.

Olaf A. Classel, 88 years old, a pioneer of the big Alaskan gold rush before the turn of the century, and long a mining man in Alaska, died recently in Seattle, Wash. Born in Sweden, he came to the U. S. A. when 27 years of age. He went to Nome, Alaska, in 1897 as a representative of the Pioneer Mining Co., and later became manager of the E. O. Lindblom mining interest.

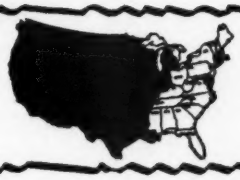
Ralph B. McKinney, general manager of the papermakers' chemical department and member of the board of directors of Hercules Powder Company, died September 21 at the Delaware Hospital, Wilmington, Del., after a two weeks' illness. A native of Wilmington, Mr. McKinney had been associated with Hercules since its organization in 1913.

NEWS and VIEWS



The urgent drive to stock coal in the Great Lakes region for winter gets a lift from modern clamshell buckets. Recently built by Blaw-Knox Co. for a coal company on Lake Superior, two of these giants are rated to handle 17½ tons of coal. One grab will furnish the average home user with a two-year supply. . . three bites will load a hopper car

Eastern States



New Mechanized Coal Mine to Be Developed

The Clinchfield Coal Corp. will develop a new mine on Meade Fork to produce around 1,000,000 tons of coal per year. The C. & O. Rwy. is now constructing 14.5 miles of new rails to serve this property, including a 3,400-ft. tunnel from Letcher County, Ky., to Wise County, Va., through Pine Mountain.

Meeting Studies Hazards of Coal Dust Explosion

More than 100 people attended the regular meeting of the Central West Virginia Coal Mining Institute held at Fairmont on September 11. In the absence of President E. Frank Miller the meeting was presided over by P. J. McGraw, inspector at large for the State Mines Department. W. D. Walker, engineer in charge of the U. S. Bureau of Mines, was director of the program and introduced the speaker, E. E. Quenon, a mining engineer from Pittsburgh, who is also a member of the bureau.

Mr. Quenon demonstrated several kinds of equipment and explained the workings of each. The explosibility comparison of coal dust as to fine sawdust, cornstarch and aluminum dust was demonstrated. These same dusts were ignited several times so as to show that the same dust will explode more than once. It is claimed some coal dusts will explode as high as 25 times. Mr. Quenon also demonstrated the ignition of methane gas in relation to permissible and non-permissible equipment. He stressed three lines of defense against mine gas explosions, as follows:

1. Adequate ventilation so as to sweep and dilute the dangerous gases to become harmless.
2. Detection of gases to be used if the first line should fail.
3. Avoiding a source of ignition—without a source of ignition there can be no explosion.

Coal Show Well Attended

The Southern Appalachian Industrial Exhibit, or "Coal Show," at Bluefield, W. Va., at the end of August, lifted the curtain on a host of new machines, coal-mining equipment, and advances in safety and accident prevention before an unusually large gathering of spectators from throughout the region. This show, which was held from August 22 through the 24th, stressed the progress of mechanization in coal-mine operations and the utilization of coal and its by-products in many new directions. The increase in safety, health, accident-prevention devices, some of them resulting from wartime research, also featured the program. The show was staged at the Norfolk & Western freight terminal by the Pocahontas Electrical and Mechanical Institute, in cooperation with mining and industrial interests.

Eighty-eight Men Receive Miner Certificates

Eighty-eight Island Creek employes passed the miners' examination given at the personnel office in Holden on September 11 by C. R. Santrock, chairman of the Miners' Examining Board for the West Virginia Department of Mines. In addition 23 local candidates for mine foreman certificates began a course of study on September 17. This class will meet every Tuesday night for several months at the K. of P. Hall in Holden, where they will work under Page Dickens, of West Virginia School of Mines, who is serving as instructor.

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Anthracite Institute Completes Transfer

The Anthracite Institute has completed the transfer of all its equipment from Primos, near Philadelphia, to the new headquarters of the Institute at Wilkes-Barre, Pa. Work has been resumed on numerous projects interrupted by the move. In reviewing the laboratory's activities since it was established 16 years ago, Dr. Johnson reported that it has made more than 900 different investigations on all phases of basic and applied research concerning anthracite and in testing equipment. These include 163 stoker investigations, 129 on controls, 61 on boilers, 28 on furnaces, 38 on space heaters, and many others ranging from kitchen ranges to fireplaces.

Strike Agreement Reached

The first break in the prolonged strike picture at the Allis-Chalmers Manufacturing Co. came on September 16 when the company concluded an agreement with the CIO United Electrical Workers local at its Pittsburgh works. The settlement, generally following terms offered in a company proposal, left six other Allis-Chalmers plants still strike-bound, although back-to-work movements have been growing steadily at three of these. The new Pittsburgh contract runs until April, 1948, and may be reopened on wages after April 15 of this coming year. However, with the acceptance of a company proposal for Government supervised strike votes, the union can call for a strike in support of its wage demands only after a majority of the employes vote for such a strike in a referendum held on company premises at company expense under the supervision of the National Labor Relations Board or the United States Conciliation Service. Other provision in the contract include irrevocable voluntary checkoff of union dues and assessments, rather than the continuance of maintenance of membership asked for by the union, and an increased arbitration set-up covering such issues as equal pay for equal work, new job classifications, disciplinary measures and seniority preferences. The company waived a prior service requirement of its vacation plan, offering to distribute vacation checks to Pittsburgh workers immediately. In a telegram to Pittsburgh works employes, company and union officials, Walter Geist, Allis-Chalmers president, expressed a desire for future harmony between company and union, based on recognition of mutual responsibilities. He pointed out that "the successful and satisfactory conclusion of this agreement between the company's negotiating committee and the new bargaining committee for the union is a testimonial of the fact that when reasonable men sit down to discuss their differences with sincerity of purpose, moved only by a desire to deal fairly and to reach an agreement as early as possible, it can be done. The overwhelming support the union members gave their new bargaining committee speaks well for their faith in that leadership."

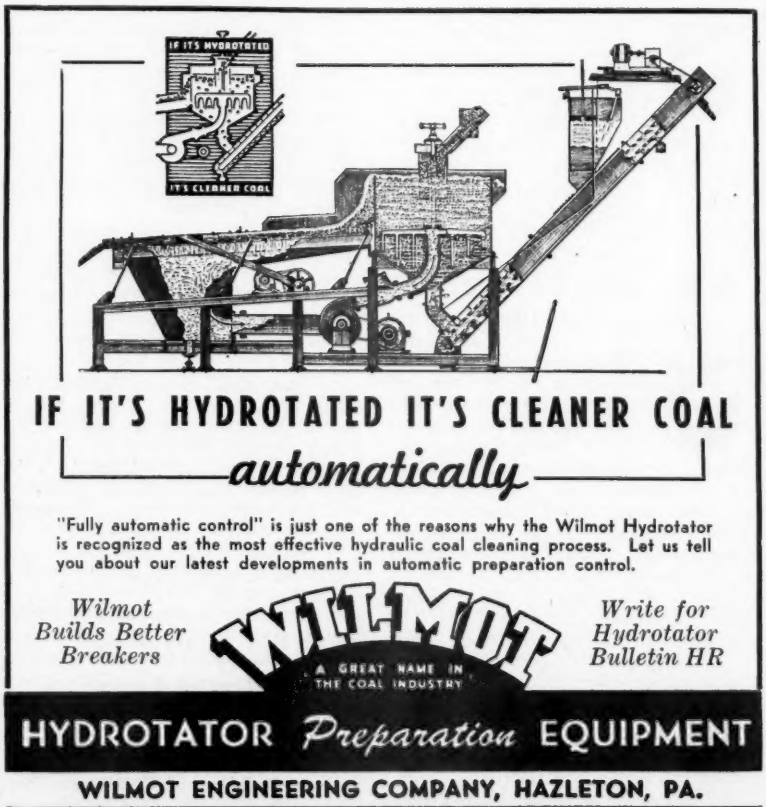
Anthracite-Oxygen Gas Tests Completed

Under the general direction of Dr. C. C. Wright, of Pennsylvania State College, tests covering the manufacture of synthesis gas from anthracite and pure oxygen instead of air were completed at the Trail, British Columbia, plant of the Consolidated Smelting & Mining Co. recently. Sponsored by the Anthracite Institute, the tests were conducted by representatives of the U. S. Bureau of Mines, Pennsylvania State College, the Consolidated Smelting & Mining Co., the Wellman Galusha Co., and the Anthracite Institute.

As this is the first time that Pennsylvania anthracite has been combined with pure oxygen on a commercial scale, the results when compiled should be of great value in connection with a determination of the economics of this new method of making gas. As yet the final report has not been released on these tests, but it is understood that the results in reference to gas analysis and its plant performance were entirely satisfactory. The widespread use of oxygen in gas plants is conceded to hinge largely upon its cost and, as this has decreased sharply in the past few years, these tests are expected to provide a means for determining whether the point has been reached where oxygen can now be considered more economical than air.

Copper Fabricating Plant to be Built

As soon as building permits are obtained the Calumet and Hecla Consolidated Copper Co. is planning to construct a new fabricating plant at Decatur, Ala. The new plant will manufacture tubing and allied products of copper, copper-base alloys and aluminum. Because of lack of building space, the company's present Wolverine tube division plant in Detroit cannot be expanded and the new



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plant will augment the production of the older operation.

Expansion in Field Production

An extensive new construction program at the Fairfield Sheet Mill of Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., requiring approximately two years for completion, was announced earlier in September by Robert Gregg, president of this U. S. Steel subsidiary.

The main objective of the program is to modernize and improve the facilities at Birmingham for the production of sheets through a conversion from the Tennessee Company's present hot-rolled method to the cold reduced method of producing sheets. Another major improvement will be the installation of equipment for the production of galvanized sheet metal in coils, thus making Fairfield one of the few sheet mills in the country capable of providing such material.

Fluorspar Mine Acquired by Pennsalt

The Kentucky Babb Fluorspar mine near Salem, Ky., was recently purchased by the Pennsylvania Salt Manufacturing Co. The mine and surface plants were purchased from Roberts and Frazer, active in other fluorspar mining operations as the Kentucky Fluorspar Co. Underground explorations were recently completed by Pennsalt at this operation and the Kentucky Babb mine is now producing.

Coal Institute Formed

Meeting in High Point, N. C., late in September, the North Carolina Coal Institute was formally organized. The newly-formed institute is composed of coal shippers, carriers and representatives of coal heating concerns. Its primary purpose is to start a drive against the competitive inroads of oil and gas. J. P. Erwin of Durham has been elected president of the new organization.

MARSHALL HANEY, Ph.D.
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Engineering Congress in Brazil

Three Department of the Interior officials have departed for Rio de Janeiro, Brazil, where they will comprise a part of the United States delegation to the Second Pan-American Congress of Mining, Engineering, and Geology.

The men are: Dr. R. R. Sayers, Director of the Bureau of Mines; Dr. William E. Wrather, Director, Geological Survey, and Roger Rhoades, Chief Geologist of the Bureau of Reclamation. Dr. Edward Steidle of Pennsylvania State College is also an official delegate.

The congress will include excursions and field trips. The work of the congress has been divided into 12 sections, covering topics such as metallic and non-metallic ores, fuels, mineral industries, ore dressing and concentration, mineral and underground waters, mineral economics, and mining legislation.

Government Seeks Coal Mine Inspectors

The U. S. Civil Service Commission is seeking qualified coal mine inspectors for work in all coal mine areas in the nation. Salaries range from $3,397 to $5,905 per year. The minimum amount of experience required ranges from five to eight years practical work in coal mining, part of which must have been specialized and of a responsible nature.

Application forms may be secured at U. S. post offices or by writing to the U. S. Civil Service Commission, Washington 25, D. C. The Commission states that applicants must not be over 48 years of age and will be required to make inspections and investigations of coal mines; participate in rescue work; prepare reports on health and safety conditions; and to aid in the dissemination of information for the purpose of reducing mine accidents.

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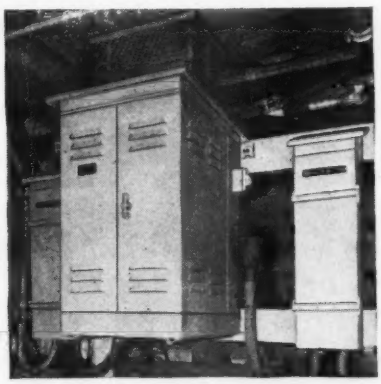

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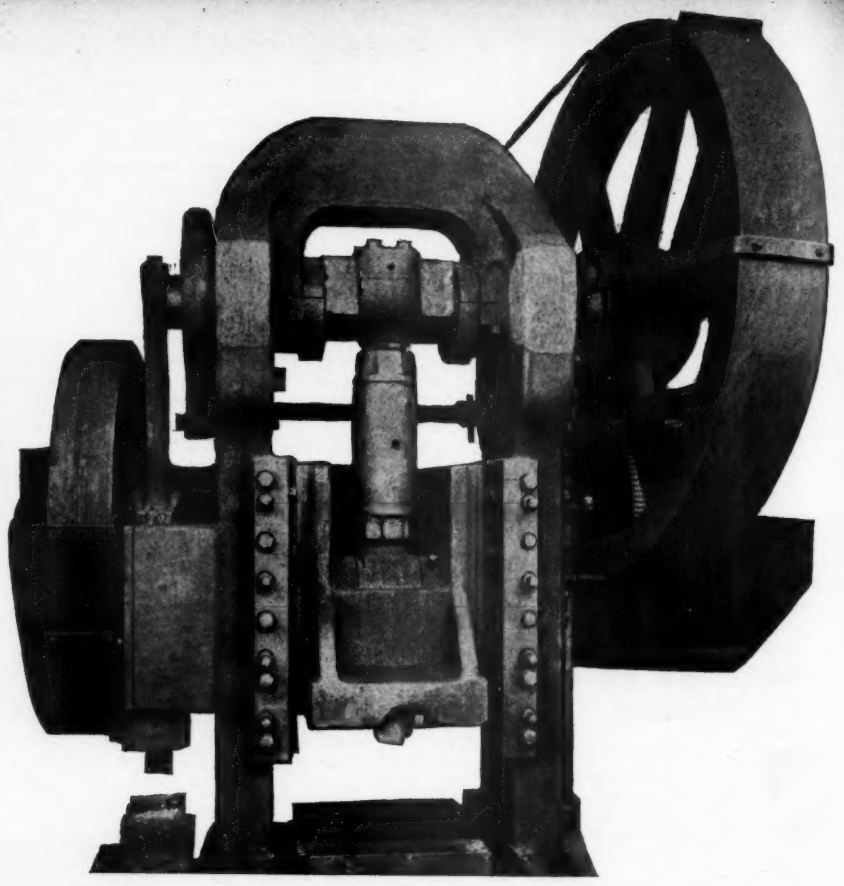

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Bronze Welding is quick, economical, practical. You save on preheating and annealing time, and also on oxygen and acetylene.

Because of the lower temperatures employed, no serious stresses are set up, there is less possibility of warping or cracking, parts can often be welded without dismantling equipment, and intricate sections of cast or malleable iron, steel and copper alloys can be joined quickly and economically.

In addition to Tobin Bronze* and "997" Low Fuming, Anaconda Welding Rods are available in a range of compositions suitable for almost every gas or electric Bronze Welding purpose. For detailed information, write for Publication B-13, "Anaconda Welding Rods." 46136

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Central States

Coal Fire Perils Mines

A second New Straitsville mine fire was reported on September 19, threatening the coal fields of Hocking County beyond the Lost Run barrier which boxes in the famous Straitsville fire that destroyed $50,000,000 worth of Perry County coal since 1884. U. S. Bureau of Mines officials stated that the new fire, if not immediately curbed, would spread east, south and west through Hocking and Athens Counties and destroy thousands of tons of coal, towns, forests and oil and gas wells. E. E. Quenon, of the Pittsburgh office of the U. S. Bureau of Mines, advocated strip mining to reach the burning coal to prevent "widespread destruction of coal reserves." An investigation failed to reveal what started the fire, which was discovered August 13 near Greendale at the abandoned Sand Run 15 mine.

New Coal Stripping Operation

C. C. Lydick, managing director of the Coal Trade Association of Indiana, has announced that the Sycamore 30 mine of the Maumee Collieries Co. is engaged in a new strip operation in Sullivan County, about 2 miles south of Dugger. Coal from the new mine is prepared through the tipple of Maumee's Sullivan 27 mine.

Production in Indiana during 1946 to September 1 is estimated at 13,756,000 tons of coal, which is 3,704,000 tons less than for the same period of 1945. This loss in tonnage was due to the general strike in April and May.

Indiana Coal Program

The Indiana Coal Preparation and Utilization Society started its fall and winter series of programs on October 11, 1946, with guest speaker John Dunn of Allis-Chalmers Manufacturing Company, who addressed the society on screening and dewatering of coal. Dr. Harold J. Rose, director of Bituminous Coal Research, Inc., will address the society on November 8, 1946, with a talk on the research program of Bituminous Coal Research, Inc.

Programs have been arranged tentatively to carry through the March, 1947, meeting. The speakers will discuss subjects pertinent to Indiana coals in general. Officers now in office are G. F. Bieler, general superintendent of Snow Hill Coal Corporation, the president; Hugh B. Lee, Jr., of the Maumee Collieries Company, first vice president; Russell Bedwell of Deep Vein Coal Company, second vice president; and H. O. Erb, coal preparation engineer and consultant, secretary-treasurer.

Coal Research Conference

The Illinois Coal Research Conference will be held at Urbana, October 23 and 24, under the auspices of the State Geological Survey. Papers to be presented will feature the results of the research work on various coal problems conducted by the State Survey. Scheduled to speak at the meeting are members of the Survey, including Frank H. Reed, R. J. Helfinstine, R. J. Piersol and G. H. Cady.

Discussions will embrace such subjects as "The Use of Illinois Coal for the Production of Metallurgical Coke," "Combustion Studies of Illinois Coals in a Domestic Stoker," "Briquetting of Illinois Coals Without a Binder," and "The Content, Conduct, and Results of the Inventory of Illinois Coal Resources."

Anderson Pace, general industrial agent of the Illinois Central System, will speak at an informal dinner on October 23, and George Stoddard, president of the University of Illinois, will address a luncheon session on October 24.

Those attending the meeting will be able to inspect the work in progress at the Applied Research Laboratory of the Geological Survey, the Mechanical Engineering Laboratory, the I-B-R Research Home, the New Warm Air Research Residence, and the Geological Survey Laboratories.

Work Continuing on Seneca No. 2 Shaft

Calumet & Hecla Consolidated Copper Co. now have a force of men repairing Seneca No. 2 shaft at Ahmeek, Mich. As an adjunct in this development a drift is being advanced north from the 30th level of the Ahmeek No. 4 mine to a point under the shaft where a raise will be extended upward to connect with the bottom of Seneca No. 2 shaft. When this shaft connection is completed, explorations in the area will be extended. A hoist has been transferred from one of the Osceola shafts to Seneca No. 2 to operate two 8-ton

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capacity balanced skips. Ocha Potter is superintendent of the operation and Harry Hicks is mining captain at Seneca.

New Conveyor Gallery Under Construction

Pickands Mather & Co. is erecting a new conveyor gallery at the Cary mine at Hurley, Wis. Structural steel for this gallery and a railroad pocket is being erected by the Wisconsin Bridge & Iron Co. so that the mine will be ready for ore storage this coming winter. The conveyor belt is of 30-in. width and will carry ore and rock from the screen and crusher located in the shaft headframe to the tracks, where it will be loaded from a receiving pocket directly into railroad cars.

School of Mines to Give Course in Social Study

The consolidation of three departments of instruction at Missouri School of Mines and Metallurgy into one department to be known as the Department of Humanities and Social Studies was approved by the board of curators of the University of Missouri on recommendation of Dean Curtis L. Wilson at its meeting on August 30. Professor S. H. Lloyd, presently professor of economics, will head the new department. The new department will offer courses in English, economics, history, sociology, psychology, and foreign languages.

The purpose of the consolidation is to make more effective the recommendation of a committee of engineering educators made in 1940 concerning engineering education after the war. This committee suggested that the equivalent of about one academic year be allotted to the area of humanities and social studies to augment the technological education of the young engineer.

Hunter Mill Being Dismantled

The Hunter mill of the American Zinc, Lead & Smelting Co. is being dismantled at Aurora, preparatory to moving and rebuilding it on the Winakah smelter site at Ouray, Colo. As all of the known ore bodies on the Aurora property have been mined out, the company is abandoning these operations in the region.

Open Pit Being Dewatered

The Stanley Mining Co. has engaged Skubic Brothers, contractors, to dewater the Mary Ellen iron mine, located about 1 mile northwest of the village of Biwabik, on the Mesabi Range. The Mary Ellen open-pit mine operated the first jig treatment plant on the Mesabi Range. The mine is being dewatered for examination purposes. From 1924 to 1930 the Mary Ellen produced a grand total of 518,759 gross tons of iron ore.

Plant to Make Iron Powder from Slate Wastes

Waste iron carbonate slate will be converted into pure iron powder at a modern plant at Aurora, in the Mesabi iron range. This plant will be operated under contract with the state of Minnesota by the Continental Machines, Inc., makers of machine tools. It is estimated that the cost of this new plant will be about $1,000,000.

The contract granting Continental a 10-year lease with option to purchase the plant from the state of Minnesota calls for a royalty to the state of 1 cent a pound for the fin-

Parmanco
MECHANICAL FEED
HORIZONTAL DRILL.

Heat-treated gears are used in this transmission and spur gear reductions, with an ample factor of safety for the operation of machine under all conditions. Link-Belt bearings of extra size are used throughout. Augers are connected to main drive shaft through a self-aligning chuck of ample size, in which is secured the drive shaft by two shear pins which provide sufficient safety to rest of machine. The machine is raised or lowered to a height of 36 inches by jacks on front of machine, and rear of machine is mounted on two pneumatic-tired wheels which also have a 36-inch range of adjustments. The machine permits the drilling of a controlled-angle hole, which makes possible a great saving in the use of explosives through the cantilever effect of this controlled-angle drilled hole.

PARIS MANUFACTURING COMPANY
PARIS, ILLINOIS

ished iron powder produced. The plant will have an estimated capacity of 5 tons of iron powder a day. It is estimated that production will begin in about six months.

The process used for recovery of the iron powder from the slate is to dissolve the slate in acid. The product then is reduced to iron powder with a purity of over 99 per cent. The process has been proven in laboratories, according to state authorities, and is considered important because of the dwindling high-grade ore reserves.

The slate overlies the rich Mesabi iron ore formation, and in the past has been considered a waste product. The state's interest stems from the fact its reserves of high-grade ore on the range are definitely limited. The contract earmarks 50 per cent of the finished product for use by Minnesota manufacturers. Automotive and farm machinery gears and many other products may be cast in the cold powder. U. S. Steel and other steel companies, as well as a number of mining concerns, have been working on details to develop the treatment of the low-grade ores.

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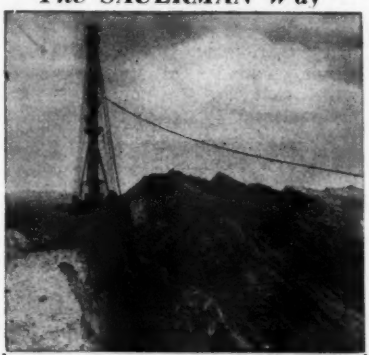

At Velva Mine of Truax Traer Coal Co., a tower machine equipped with 12 cu. yd. Sauerman Crescent scraper strips a wide cut, handles 7500 cu. yd. every 24 hours.

Sauerman Tower Machines offer an improved means of stripping large bodies of coal or ore.

On such work, the long reach of a Tower Machine enables it to make a much wider cut than is possible with other types of equipment. Not only does it make a wider cut, but at the same time it disposes of the spoil just where wanted.

These machines also are used successfully in loading loose materials from pits and in handling large stockpiles. For this type of service the head tower is equipped with an adjustable ramp.

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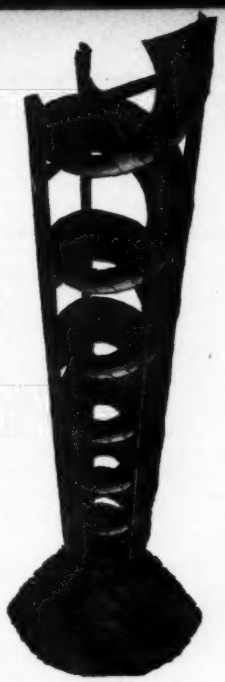


. . . AVOID BREAKAGE

The advantage of Holmes' spiral over previous chutes of this nature lies in the design of the carrying surface, which is formed much as the bowl of a race-track, having no retaining wall on the inside edge. Elimination of this inside edge allows the material to slide gently onto the peak of the pile without droppage. By the same token, the peak of the pile may be carried around the interior of the bin in such a manner that the material is deposited in overlapping layers, where the problem of segregation is present.

ROBERT HOLMES AND BROS.

BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES

DANVILLE, ILLINOIS

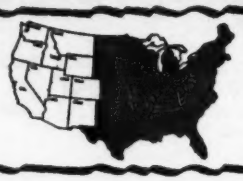
With the advent of scientific consumption of coal and the increased demand for a clean, sized product, much study was given to methods by which so fragile a commodity might be handled into bins and silos without excessive degradation. This problem was solved by using lowering spirals designed to take the material from the conveyor and carry it gently to the bottom of the bin.

Design is such that the lowering speed of the material is automatically retarded when it begins to exceed a safe limit. Regardless of the distance the material travels, its velocity remains uniform; and it reaches the bottom in a continuous, even stream.

Spirals are available with the carrying surface covered to form a spiral tube for lowering above bin enclosure and thus give weather protection.

Coal Bunker Storage

Western States



Geophysical Prospecting Methods Being Used

In the Kokomo area the U. S. Bureau of Mines is assisting in the development of mineral reserves. Frederick W. Lee, chief of the geophysical division of the bureau, reports that a government crew is trying out geophysical methods on some selected areas. The crew began working in August and is trying to extend old workings and determine whether ore reserves exist.

Progress Reported on Gold Operation

The Terrible-Dunderberg properties, located just west of Silver Plume, are being developed by Gold Mines Consolidated, Inc. Under the management of George Rowe, the main shaft has been retimbered and present work consists of retracking the main adit. Underground ore bins are being constructed and the present air hoist is being reconverted into one powered with an electric motor. Walter E. Scott, Jr., of Central City, is consulting engineer for the operation.

Former GI's Leasing Mining Claims

A group of about 28 men, largely composed of ex-GI's and Army officers, have leased the old Uncle Sam silver mining property about 6 miles from White Signal, in Grant County. The men have formed a limited partnership and plan to renew workings on the old shafts and to set up a small mill. Officers of the company are Capt. Ed Retartyk, who is treasurer; Albert Glenn, formerly stationed in Hawaii and who worked as engineer with Bethlehem Steel, is mining engineer; and H. C. Ertel, who has been named superintendent.

School of Mines to Increase Faculty

Dr. E. J. Workman, newly elected president of the New Mexico School of Mines, has announced that the school will increase its faculty and expand its courses for the school year 1946-47.

Dr. Workman stated that some restrictions may be made in registration this fall due to an expected large increase in applications for college studies. Housing and laboratory facilities will determine the extent of these restrictions. Senior and junior students will be allowed to register unreservedly, while freshmen and sophomores may be limited to present and former students, veteran residents in New Mexico, non-veteran residents, non-resident veterans, and others, in the order named.

Association Changes Name

In accordance with the unanimous action of the executive committee of the Utah Metal Mine Operators Association the name of the organization has been changed to the Utah Mining Association. This change was made effective as of September 1, 1946.

Substantial Ore Production from an Old Property

As the result of a comprehensive development program under way at the Horn Silver properties at Beaver County, Utah, substantial ore production has been obtained. Old producing areas were opened up through rehabilitation and new developments have extended the ore reserve tonnages. This operation is famous in western mining history and it is credited with a past production of some $50,000,000 in marketed metals, and was a major factor in the early growth of the state of Utah and the city of Salt Lake.

Now operated under a lease agreement by Metal Producers of Los Angeles, a new era looms for the famous old Horn Silver—with steadily increasing ore production indicated. Under the direction of James H. Wren, general superintendent, the mine produced 74 ozs. of gold in August, 11,840 ozs. of silver, 220,000 lbs. of lead, 22,200 lbs. of copper and 13,200 lbs. of zinc. The mine is operated throughout by electricity and the surface equipment consists of a 125-hp. double-drum electric hoist, 100-hp. air compressor, completely equipped sawmill, blacksmith shop, machine shop, change rooms and mine office. The underground workings are electrically lighted, and haulage is by battery locomotive.

Present operations are being conducted through the King David shaft, located some 1,600 ft. west of the old Horn shaft.

RFC-Owned Mill to Concentrate Lead Ore

The Domestic Manganese & Development Co. has been appointed agent for RFC to operate the RFC-owned flotation mill at Butte, Mont., as a custom mill in the concentration of lead-bearing ores. This action was taken because of the serious lead shortage.

The quantity and type of ore to be accepted will be limited by the requirements for economic operation of the mill. No deliveries will be accepted after June 30, 1947, and contracts may be terminated before that date upon terms negotiated between producers and RFC. The mill has a capacity of approximately 400 tons of ore per day, and was used during the war to concentrate manganese.

Old Mine Working on Water

The Elkhorn Mining Co. has unwatered to the 450-ft. level of the old workings of the Elkhorn mine. This has dried new operations located 225 ft. in the footwall territory of the original Elkhorn incline. Wade V. Lewis, manager of the operations, states that they are now down vertically about 130 ft. and have a full floor of lead-silver-zinc ore.

Important Silver Mine to Be Reopened

The Nivloc mine, 7 miles south of Silver Peak, and formerly operated by Desert Silver, Inc., is being reopened by a newly organized company, Nivloc Mines, Inc., the *Times* reports at Tonopah. From 1938 to 1943 the Nivloc, headed by Ira B. Joralemon, was Nevada's largest producer of silver. It was shut down in 1943 when war conditions made the operation impossible and it appeared that the scrap value of the mine and mill plant would exceed the profit over a long and costly suspension of operations.

Substantial ore reserves had been materially increased by the recent rise in silver from 71.9 cents to 90.5 cents an ounce. Operations at the mine have been started and will be accelerated as fast as equipment can be secured and labor recruited. At the present ore will be treated at one

of the custom mines in the area. As soon as materials can be purchased, a 100-ton mill will be placed on the property. Nivloc Mines, Inc., is headed by Harry H. Huges, president and manager.

Activity on the Comstock Lode

Plans are in the making for the resumption of operation of the Dayton Consolidated Mines Co. mill at Silver City. This is considered one of the most encouraging items of news from the old Comstock lode since the war. According to Homer L. Gibson, president and managing director of the company, the company must do considerable reconditioning work on its own underground workings before the mill resumes operation. Capacity tonnage must be supplied for economical operation and underground repair work must be completed in workings which are drained by the Sutro tunnel. In the past the Dayton mill has handled much custom ore from lessees and small mine operators in the region.

Tonopah Belmont to Erect Mill

The plans for erection of a mill by the Tonopah Belmont Consolidated Mines Co. are now definite. The mill, purchased near the old camp of Benton, will have a daily capacity of 150 tons and is to be constructed on Belmont ground not far from the Desert Queen shaft. The Belmont was one of the famous producers of Tonopah and W. J. Loring, who is in charge of the project, states that it can still be a producer and dividend payer.

Full Capacity Production Anticipated by Phelps Dodge

An official of Phelps Dodge Corporation has confirmed the report that approximately 1,200 new employes will be added to working forces at the corporation's mines, mills and smelters at Bisbee and Douglas by the end of October and present plans call for the addition of around 2,500 men at its Morenci properties. It is emphasized that no new expansion plans are on foot and that the enlargement of working forces merely looks to full utilization of all existing facilities so that production at full capacity will be achieved well before the end of the year. It was indicated that most of the old employes stayed in the camps during the recent strike and as a result of the higher scale of wages in effect since July 1, plus ample housing, many job seekers were brought to the copper districts.

Large Silver Deposit Discovered

Discovery of a 300,000,000-ton silver ore deposit near Tiger mine not far from Mammoth, Ariz., has resulted in a full-size mining project. The Silver Crescent Mining Co., Inc., recently began operations on this deposit. The company is composed of 30 residents of Mesa who are working 150 claims of the 300 located around the strike. Roy Tollen discovered the silver ore last January. Milton Roe, managing agent of the company, describes the ore deposit as one of the largest in the history of Arizona. The location is estimated to contain much gold and copper.

New Map Available

A new map showing the location of over 300 mineral deposits in the state of Oregon has just been published by the State Department of Geology and Mineral Industries. The principal localities of 43 minerals are shown in red on a base map and brief explanatory notes describing 12 of the most important ores are printed on the margin. A small index map showing generalized location of beach and stream gold placer deposits is also given. Copies of the map may be obtained at the

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department's office, 702 Woodlark Building, Portland, price postpaid 10 cents.

Dredging Operation Under Way

The B-H Company, of Medford, Oreg., has started dredging on Sucker Creek in Josephine County. Several buildings have been constructed and a road connecting the camp with the Oregon Caves Highway has been built. Tom Gerety is in charge of the dredging operation.

New Shaft-Sinking Record

IDAHO

The Polaris Mining Company claims the shaft-sinking record in this district by sinking the Polaris three-compartment shaft 184 ft. in 30 days. The only other comparable shaft record is at the Sunshine where in December, 1929, the four-compartment Jewell shaft was lowered 175 ft. in 29 days, and again in November, 1936, the shaft crew completed 180.7 ft. in 30 days. The Sunshine's shaft was a four-compartment job and all mucking was done by hand, as against Polaris three compartments with mucking accomplished by clam-shell power-shovel devices.

Cadmium Production from Lead Smelter Fumes

Bunker Hill & Sullivan Mining and Concentrating Company is successfully producing cadmium metal of a purity of 99.95 per cent from lead smelter fumes at its Kellogg plant. During 1905, the first year of full production, the cadmium unit turned out 224,838 pounds of cadmium metal valued at about 90 cents a pound. The price of the metal has varied from 50 cents a pound in 1926 to $1.60 a pound in 1937 and 90 cents a pound during the war years. The Bunker Hill process is different than other processes in use. It is a combined leach and retort method perfected by Bunker Hill chemists after five years of experimental work.

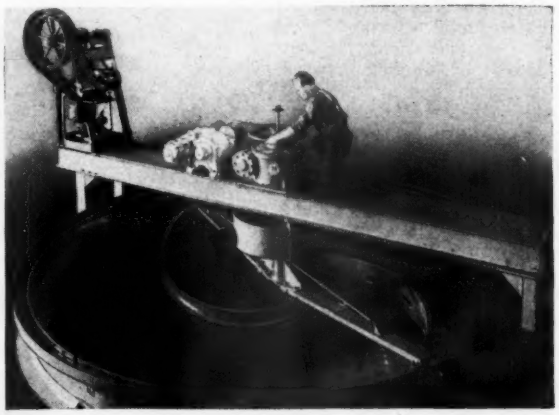
Ore Shipped from Lead-Zinc Operation

The Paymaster zinc-lead mine, located in a canyon northwest of the Craters of the Moon, near Arco, Idaho, is again shipping ore at the rate of three carloads a week with seven men employed. The ore is shipped to Utah smelters. The mine was formerly worked for its lead ores, but the percentage of zinc gradually exceeded the lead values and the mine was closed for several years. It is now owned and operated by C. G. Gressman, of Arco, and J. K. Smith, of Blackfoot.

New Development on Merger Ground

Merger Mines property in the silver belt will be developed from the 3,000-ft. level in the Silver Summit shaft, L. E. Hanley, president of the Polaris Mining Company announced recently. An agreement provides for the development work by officials of the Silver Summit and Merger companies. The Polaris owns a controlling interest in the Silver Summit and is engaged at the moment in sinking the Silver Summit shaft to the 3,000-ft. level. The shaft work is expected to be completed some time before the first of the year. The ore will be treated at the Polaris mill.

Mr. Hanley stated that a cross-cut from the Silver Summit shaft should intersect the vein system at about 400 to 500 ft., and that about 2,000 ft. of drift work to the east would be required to enter Merger ground.



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Gold Mine Purchased

The Bradley mining interests, owners of the Yellow Pine Mines and the Ima Tungsten mine in Idaho, have purchased control of the Royal Consolidated Gold property at Hudson, Calif., where sampling is said to have indicated 500,000 tons of gold ore available for treatment.

Pumice Production Under Way

The U. S. Pumice Supply Co. at Leevining, Mono county, Calif., has started production of pumice, according to William Longnecker, superintendent. The mill is turning out grill masters, crude and finished grill master blocks, with hauling contracted to Mojave Corporation. Mining of the pumice is contracted to Henry Babineau.

Two Silver Mines to Be Reopened

American Silver Corporation will reopen two mines in the vicinity of Panamint City, San Bernardino county, Calif. A crew of 14 men are now at work rebuilding roads to this once renowned mining camp. Two tractors and six trucks are engaged in this work through Surprise Canyon. Shafts and tunnels of the two properties will be cleared of debris and air ducts installed to permit exploration of old working and subsequent sinking and drifting. If sufficient ore is developed in these operations a mill will be erected on the property.

Rich Ore Deposit Being Opened

The Big Lake Mining Co.'s mine, 13 miles southwest of Kettle Falls and west of the Columbia River, has cross-cut 18 ft. of lead, zinc, silver and gold bearing ore at a depth of 600 ft. in the extension of its 900-ft. exploration tunnel. The company's property consists of 12 mining claims rather extensively prospected by shafts, pits, open cuts and two exploration tunnels, besides the tunnel in which the recent discovery was made. There are several vein outcrops on these claims which appear to be unrelated to the one under development.

Much of the ore is of good milling grade, assaying 3.1 per cent lead, 2.1 per cent zinc, 2.9 oz. of silver and .02 oz. gold, according to President Will Everett of the company. The surface ores assayed up to 30 per cent lead, 5 per cent zinc, $23.80 silver and $23 in gold.

The mine is one-half mile west of the newly constructed Incheliun-Kettle Falls Highway, 1,000 ft. above the Columbia River level, and 1,400 ft. from the Colville P. U. D. electric line. The operation is equipped with fair mine buildings, shop and compressor plant and ventilation system. Five men are employed at the moment and most of the company's shares are held in Spokane.

Storing of potassium chloride in California

New Exploratory Firm Incorporated

Organized for the purpose of searching for minerals and the location of mining claims upon which any minerals are found, the Big Six Corporation has been organized at Okanogan, Wash., with capitalization of $49,000. The incorporators are Frances Tallman of Okanogan, Elmer C. Cox and Bertha H. Cox of Everett, E. E. Lang, Marjorie I. Lang and Claire A. Willits, Jr., of Seattle.

Wheels of Government

(*Continued from page* 94)

pational disease laws in the several states; that trustees of the welfare and retirement funds be appointed, one by the miners, one by the operators and these two choose the third; that the $1.85 daily increase for tonnage workers be changed over to a tonnage rate; and that some procedure be set up for referring inequitable grievance procedures to an umpire.

Moreell proposed a series of definitions and percentage limitations as a solution to the controversial problem of unionization of supervisory employes.

Supervisory Employes

On October 14 the Federal Appellate Court for the District of Columbia will hear arguments on the petition of the Jones & Laughlin Steel Co., to restrain Interior Secretary Krug from continuing in effect the recognition by the Government of the District 50, UMWA Supervisory Employes Union. An examiner for the National Labor Relations Board conducted a hearing in Pittsburgh, September 11, on a UMWA complaint that the Jones & Laughlin Corporation refused to bargain collectively with representatives of the Supervisory Employes Union.

The NLRB has also directed an election to determine if supervisory personnel at the Ford Colliery Co.'s mines are to be represented by the District 50 union. The mining company registered objection that the Government is actually the employer, that the union is not a labor organization within the meaning of the NLRA, and that its certification would destroy the authority of management.

Freight Rate Controversy

Rebuttal testimony and all arguments have been completed on the railroads' petition for a general 25 per cent freight rate increase, discussed last month. Representatives of the railroads, supported by water and motor carriers, cited current operating deficits, while shippers of various commodities protested that they are paying more than their share of rail revenue now. Mining witnesses pointed out the high percentage of freight traffic which is made up by the products of the mines and warned that higher rates will result in losses to the railroads as well as to the mining industry. John B. Putnam, counsel for Lake Superior iron ore producers, declared that the proposed increases would only serve "to make the rich carriers richer and the poor ones poorer."

The ICC decision is now expected early in December.

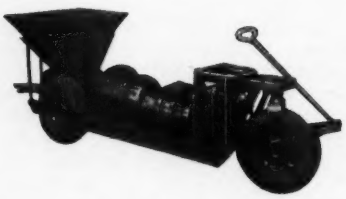
MANUFACTURERS FORUM

New Rock Dust Distributor Features Easy Portability

Ready portability is one of the major advantages offered by the new M. S. A. Bantam High Pressure Rock Dust Distributor, designed by Mine Safety Appliances Co., Pittsburgh, for effective maintenance of adequate rock dust in mine working areas.

The M. S. A. Bantam can be carried with ease on belt or pan conveyor, shuttle car, rubber-tired truck, or track-mounted truck, and can be efficiently operated by a two-man crew. No measure of effectiveness is sacrificed, however, for the Bantam's easy portability. A discharge rate of 60 to 100 lbs. of dust per minute through 50 ft. of hose classes the Bantam with large track-mounted high-pressure machines.

The most important feature of the



Bantam rock distributor is the patented screw feeder which is located below the hopper. The rotating element of this feeder is mounted directly on the motor shaft and acts to carry dust from the hopper into a compression barrel, where the dust is compressed into a solid plug just before it hits the air stream, thereby preventing the possibility of blow-back of air through the hopper.

All mechanical parts—"V" belts, speed reducers, agitators, exposed bearings—are eliminated in the Bantam. Its only moving parts are driven directly from the double shaft extensions of the motor. The Bantam unit is powered by a 2 hp. 1750 r.p.m., ball bearing, compound wound motor—dustproof and completely enclosed—which can be furnished in either permissible or nonpermissible type and in any desired voltage.

For further details write for Bulletin No. AM-2, direct to Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

Announcing plane service to assure closer contact between its personnel and customers in the various trades it serves, Charles R. Tyson, president, John A. Roebling's Sons Co. made the initial flight early in September. Accompanying him were Ernest C. Low, vice president in charge of sales; Charles M. Jones, vice president in charge of public and industrial relations and Forest S. Birtch, manager of wire rope sales

Huge Drag-line to Mine Florida Phosphate

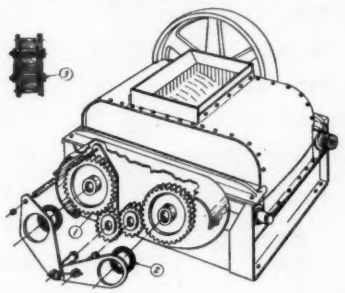
Three million eight hundred and fifty thousand pounds of overburden are excavated per hour by this huge dragline at the Peace Valley phosphate operation of the International Minerals & Chemical Corp., Mulberry, Fla. Forty-six Westinghouse motors, totaling 2100 hp., are used to power this walking dragline. Variable-voltage d-c drives are employed using two 425-hp. motors on the drag motion, two 425-hp. motors on the hoist motion, and three 125-hp. motors on the swing motion. Rototrol, a rotat-

ing type regulator, is used on all three motions of this 1285-ton Bucyrus-Erie dragline. The use of variable voltage drive with Rototrol provides extremely rapid operating cycles—faster acceleration to full speed—faster deceleration from full speed—and at the same time, due to reduction of peak and shock loads, limits the mechanical stresses in the ropes, sheaves, gears and other parts to safe values. This mammoth excavator can dig to a depth of about 130 ft. and then carry the 64,200-lb. rock load 420 ft. to the dumping spot. Each such cycle requires but one minute.

New Flexible Gear Drive

A new floating gear drive has been introduced by the McNally Pittsburg Mfg. Corp., Pittsburg, Kans., for their double-roll crushers. Called a Gearmatic drive, it is more flexible than gear trains heretofore used and allows wider adjustment of crusher-roll centers.

In this new drive, the driver gear is held in position while the driven



gear, which is mounted on a movable shaft, is followed by two floating pinions as it is shifted to new positions. The train operates in a bath of oil, the gear cover acting as a well.

The train arrangement is shown in the exploded view. The driver gear is shown at 1. The floating pinions are held in position by two pairs of swinging arms. They ride ball bearings (2) which fit over the gear hubs. The pinions turn on brass bushed pins (3).

The new drive solves a problem for many crusher users who are faced daily with wide fluctuations in the sizes of crushed products required. It also allows use of more efficient cut-tooth gears on all crushers, instead of the star-tooth cast gears frequently applied.

R. G. Holmes Retires From Gardner-Denver Company

R. G. "Dick" Holmes, dean of the mining machinery men of the Pacific Northwest, retired August 1 from his position as district manager for Gardner-Denver Co. (Canada), Ltd., at Vancouver.

R. G. Holmes

Having been connected with the company since 1911, Mr. Holmes is well known among all mining men who served time in the Pacific Northwest and Alaska, and also, of course, well known to all the coastal steamship crews, railroad men, hotel keepers, and airplane pilots serving British Columbia and Alaska.

Jack W. Turner, of Vancouver, succeeds Mr. Holmes as district manager.

New Welding Goggle

A new head-rest welding goggle which can be instantly thrown into "off guard" position for rapid inspection of setups is announced by American Optical Co., Southbridge, Mass.

Developed to eliminate waste motion and speed up welding operations, the goggle is attached by a friction joint to a comfortable headgear as-

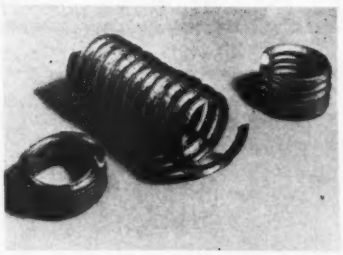
sembly. Using only one hand, the welder can flip the goggle above his eyes, where it is held securely by the friction joint, so that he has complete, unimpeded vision.

Adjustable for individual features, the goggle is equipped with opaque eyecups specially designed for wearing directly over eyes or over personal prescription glasses. It also has indirect, ventilated side shields which keep out stray light rays, sparks and metal splashes, yet provide ventilation to reduce fogging.

The goggle is available with either Noviweld or Noviweld - Didymium lenses in certain shades.

High Pressure Dual Edge Asbestos Packing Now in R/M Line

New in the Raybestos-Manhattan (Manheim, Pa.) packing line is this V-shaped packing for steam or air rods, valve stems, boiler feed-plungers, hydraulic rams, etc. It is made from woven asbestos cloth frictioned



with high heat resisting compound and molded into a V-shape. The V-shape insures automatic sealing of high or low pressure, with a minimum of surface friction on the pressure stroke and no friction on the return stroke.

— *Announcements* —

Continuing current expansion of its sales division nationwide, **Independent Pneumatic Tool Co.**, of Chicago, manufacturer of Thor portable pneumatic and electric tools, announces the appointment of J. A. Hill, formerly manager of its New York branch office, as manager of electric tool sales, and the opening of a new branch office in Cincinnati.

Mr. Hill, whose headquarters will be in the company's general offices at Chicago, has been connected with Independent Pneumatic Tool since 1920. W. C. Rush, formerly in the St. Louis branch, has been appointed manager of the new Cincinnati office, located at 426-428 Elm Street.

* * *

P. F. Bronckhurst has opened a western agency for **Hydropress, Inc.**, New York, builders of heavy hydraulic machinery and rolling mills, with headquarters in the Gas and Electric Bldg., Denver, Colo.

* * *

L. G. Schraub, vice president and general manager, has been elected to the board of directors of **Union Wire Rope Corp.**, 21st and Manchester, Kansas City, Mo.

* * *

Robert E. Segerdell has been appointed office manager of the San Francisco office of **Hercules Powder Co.**, Francis J. Kennerley, company treasurer, has announced. Formerly assistant office manager of the New York office, Mr. Segerdell will take over his duties as San Francisco office manager September 9.

He succeeds Cliff A. Mace, who will be transferred to Wilmington in January.

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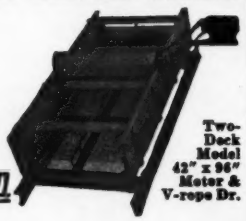

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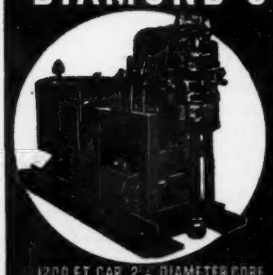

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INDEX TO ADVERTISERS

	Page
Aluminum Co. of America	Third Cover
American Brass Co.	102
American Car & Foundry Co., Insert between	12-13
Anderson Co., H. S.	18
Bituminous Coal Institute	8
Colcord, F. Carl	99
Cummins Engine Co., Inc.	20
Denver Equipment Co.	108
DuPont de Nemours & Co., Inc., E. I., Insert between	12-13
Edison, Inc., Thos. A. Storage Battery Division	19
Euclid Road Machinery Co., The	56
Gardner-Denver Co.	9
General Electric Co.	10-11
Goodman Mfg. Co.	6-7
Haney, Marshall	101
Hoffman Bros. Drilling Co.	112
Holmes & Bros., The Robt.	105
Independent Pneumatic Tool Co.	21
International Harvester Co.	4
I T E Circuit Breaker Co.	101
Jeffrey Mfg. Co., The	2-3
Joy Mfg. Co.	58-59
Kennametal, Inc.	Second Cover
Link-Belt Co.	12
Mack Mfg. Corp.	17
Macwhyte Company	103
Mott Core Drilling Co.	112
Myers-Whaley Co.	90
Ohio Brass Co.	22
Paris Mfg. Co.	104
Pennsylvania Drilling Co.	112
Roberts & Schaefer Co.	Back Cover & 101
Robinson Ventilating Co.	112
Sanford Day Iron Works	57
Sauerman Bros., Inc.	105
Standard Oil of California	13
Tamping Bag Co.	107
Union Pacific Railroad	16
Union Wire Rope Corp.	14-15
Universal Vibrating Screen Co.	112
War Assets Administration	5-55
Wilmot Engineering Co.	100
Young, L. E.	99

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